# Pit and Quarry

*Published Every Other Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.*

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## FEATURE CONTENTS


Business for the First Half of 1928 ..... 39

Men of the Industry ..... 41

Batesville White Lime Company Installs Three New Modern Kilns ..... 43
An illustrated description of this company's activities at Batesville, Arkansas.

M. L. Kernan Continues to Crush Trap Rock While Community Crowds Up ..... 47
An illustrated article featuring a situation at Orange, New Jersey.

Good Management Much in Evidence in This Eastern Plant ..... 53
An illustrated description of the operation of Ashland Sand and Gravel Company, at Ashland, Massachusetts.

Preparation of Slag for the Market ..... 56

Splendid Truck Service Key to Success of Arizona Sand and Rock Company ..... 59

Passing From One Method to Another Kansas Producer Meets Condition ..... 61

Methods of Compensating Salesmen ..... 63

Langworthy Silica Company Produces Silica Sand in Iowa ..... 66

Keeping Track of Dwindling Accounts ..... 69

New Cement Burning Process ..... 72

A System of National Highways ..... 76

Pit and Quarry Foreign Digest ..... 79

Intimate News of Men and Plants ..... 81

News of Equipment Manufacturers ..... 85


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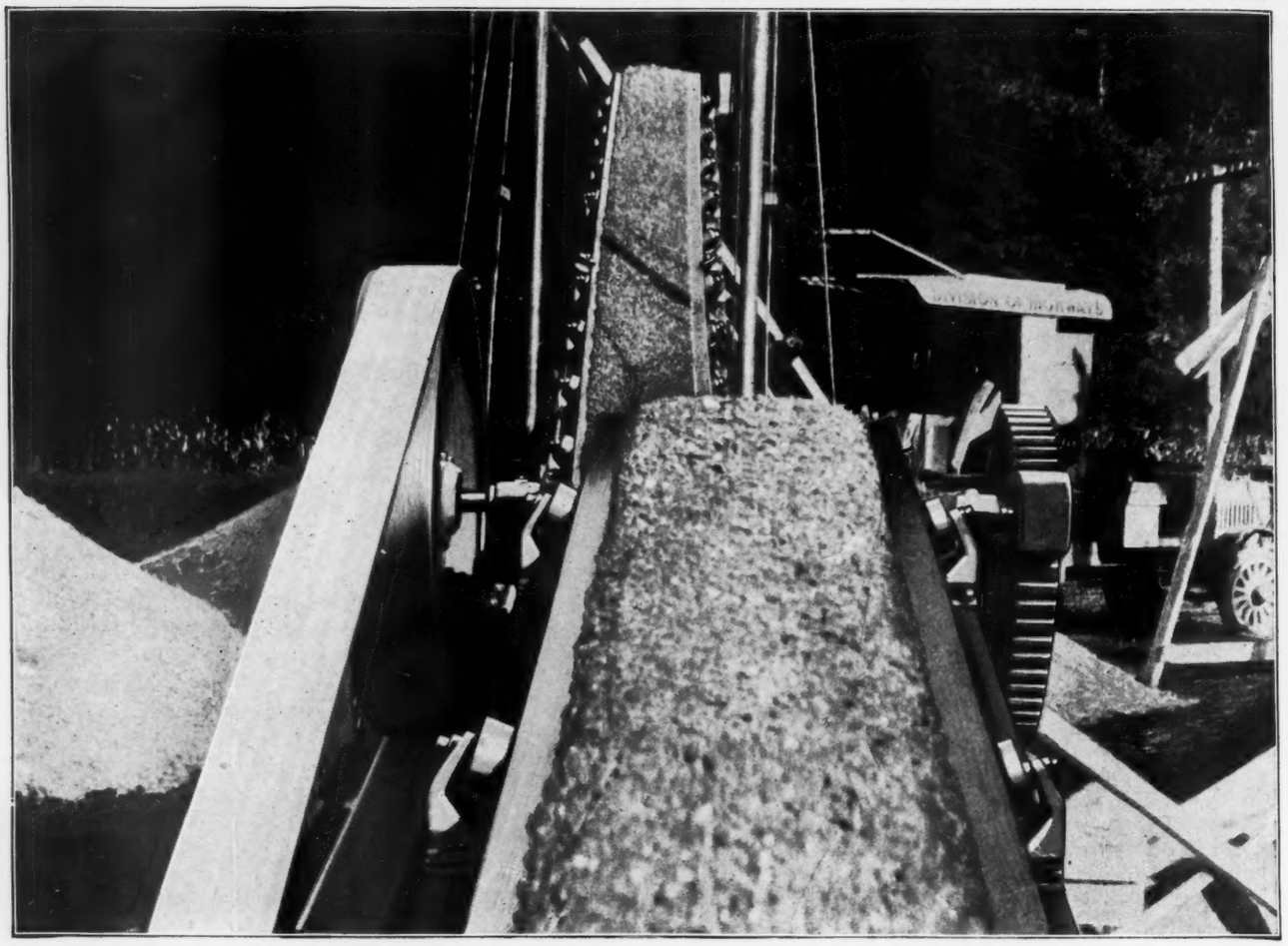
# FROM PIT TO PLANT—STORAGE—TRUCKS—BINS



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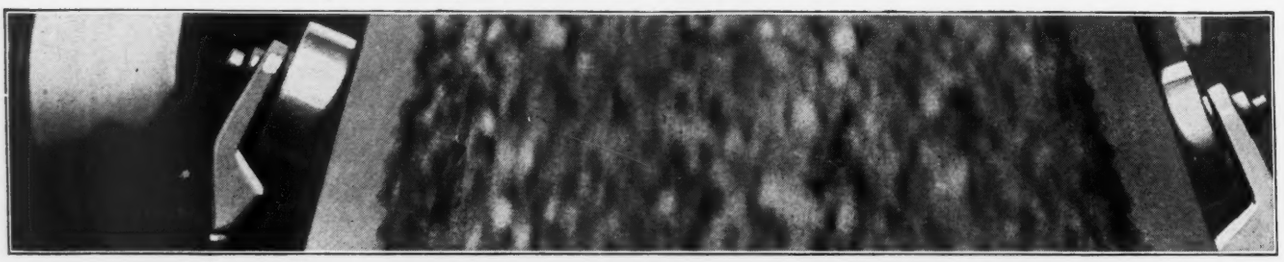

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Pit and Quarry

Vol. 16 CHICAGO, ILL., SEPTEMBER 12, 1928 No. 12

# BUSINESS FOR THE FIRST HALF OF 1928

THE nation's business during the first half of 1928 exhibited a continuance of the activity and progress which has now lasted for a sufficient number of years to mark a general stability unparalleled in the economic history of the United States or any other important industrial country. This conclusion is based upon business indicators compiled from reports of governmental and private statistical organizations for the commerce Department's semi-annual review of economic conditions. The Department also points out that the indices show that the only important industries which are lagging behind the national pace are textiles in the manufacturing group, and agriculture, and coal among the basic raw material industries.

With only occasional minor recessions, such as appeared for example during a few months of 1927, business and industry as a whole, the indicators show, remained at a high level for a long period of time. This period has been one of almost unbroken increase in production and consumption, without exhibiting any of the characteristics of a business boom. There have been unprecedented amounts of savings and investments of new capital in recent years. This investment together with improvements in methods have greatly increased the efficiency of industry and the output per worker.

The general quantitative index of manufacturing production, the most comprehensive of all measures of industrial activity, in the first half of 1928 exceeded the previous high record of the first half of 1927. The building industry, which has been during all recent years a very important factor in creating demand for manufactured products and for labor, showed greater activity than in any other six-months period in American history. The automobile industry, which so conspicuously reflects the buying power of the people, had a larger output than at any time except the first half of 1926.

The sales of mail-order houses were the largest on record, a fact partly due to the establishment of retail store outlets by the leading houses. The general volume of industrial and commercial transactions, as reflected by the value of the checks passing through the banks for payment (not counting New York City where speculative stock transactions greatly affect the totals) showed a gain of 9 per cent over the first half of 1927, which itself had made the highest record up to that time.

Electric-power production, which has been increasing very steadily at a rate usually exceeding 10 per cent annually, continued its expansion during the first half of 1928. The constantly wider use of electricity for domestic purposes reflects increasing comfort of the masses of the population, while its great expansion in industrial use means a gain in productive efficiency of factories and mines.

The large income of the people is indicated by the continuance of a great volume of savings, which take a variety of forms. One of these is life insurance, new sales of which during the first half of 1928 were the largest on record. Savings in the New York State savings banks, believed to be representative for the country as a whole, showed a large gain at the close of June, 1928, as compared with the preceding year.

The declines in a few businesses for the first half of 1928 as compared with the corresponding period of 1927 are due to exceptional conditions. The cotton and wool manufacturing industries, which had been unusually active during the first half of 1927, showed some decline in 1928. The decrease in copper and petroleum output represents a conscious effort of producers to bring about a closer balance between supply and demand and to secure a healthier condition than could exist with a continuance of the previous excessively rapid increase in production. The movement of freight on the railroads was somewhat smaller than in the first six months of 1927, but the decline was chiefly in coal and coke, the movements of which during the early months of 1927 were abnormally large because of the anticipated miners' strike. Car loadings of agricultural products were larger than in 1927, but there was some decline in those of miscellaneous merchandise and less than carload shipments, probably in part due to increasing use of motor trucks for short-haul shipments.

BUSINESS INDICATORS—Six Months, January through June

| | Unit of Measure | 1926 | 1927 | 1928 | % inc. or dec. 1928 over 1927 |
|---|---|---|---|---|---|
| Manufacturing production[1] | Index number | 109 | 110 | 111 | + 0.9 |
| Bldg. contracts, 36 states: | | | | | |
| Value | Thous. dolls | 2,989,867 | 3,072,729 | 3,317,547 | + 8.0 |
| Square feet | Thous. sq. ft | 433,918 | 411,276 | 483,560 | +17.6 |
| Automobile production: | | | | | |
| Passenger | No. of cars | 2,099,381 | 1,802,620 | 1,965,727 | + 9.0 |
| Trucks | No. of cars | 259,204 | 266,354 | 236,153 | −11.3 |
| Mail-order sales, 2 houses | Thous. dolls | 221,839 | 221,963 | 242,666 | + 9.3 |
| Check payments outside N. Y. City | Mill. dolls | 133,589 | 139,530 | 151,209 | + 9.2 |
| Electric-power production | Mill. kw. hrs | 35,547 | 39,411 | 42,359 | + 7.5 |
| Silk consumption | Bales | 237,043 | 275,060 | 288,786 | + 5.0 |
| Shoe production | Thous. pairs | 154,307 | 165,074 | 166,016 | + 0.6 |
| Steel-ingot production | Thous. long tons | 24,154 | 23,807 | 24,793 | + 4.1 |
| New paid for life insurance | Thous. dolls | 5,667,937 | 5,818,878 | 6,241,292 | + 7.3 |
| N. Y. State savings bank deposits | Mill. dolls | 3,727 | 4,036 | 4,301 | + 6.6 |
| Cotton consumption | Bales | 3,395,990 | 3,793,904 | 3,350,978 | −11.7 |
| Wool consumption | Thous. lbs | 240,449 | 279,904 | 264,216 | − 5.6 |
| Petroleum production | Thous. bbls | 360,735 | 438,056 | 435,288 | − 0.6 |
| Freight-car loadings | Cars | 24,267,591 | 25,521,040 | 23,539,858 | − 7.8 |
| Copper production | Short tons | 433,198 | 426,988 | 422,623 | − 1.0 |
| Factory employment[1] | Index number | 99 | 96 | 91 | − 5.2 |
| Prices[1] | | | | | |
| Farm (to producer) | Index number | 102 | 92 | 101 | + 9.8 |
| Wholesale, general | Index number | 100.3 | 93.9 | 96.2 | + 2.4 |
| Wholesale, nonagricultural | Index number | 100.8 | 94.7 | 94.8 | + 0.1 |
| Cost of living | Index number | 103 | 100 | 99 | − 1.0 |
| Retail food | Index number | 108 | 104 | 102 | − 1.9 |
| Business Failures, liabilities | Thous. dolls | 209,888 | 281,528 | 246,599 | −12.4 |

[1]Monthly average 1923-25 = 100.

The index of factory employment, which, however, does not include some of the newer industries, was slightly smaller during the first half of 1928 than during the corresponding period of 1927, thus continuing the movement shown in almost every year since 1919. There was, however, unusual stability from month to month. For the first time since 1923 employment in June was higher than in May. The general downward tendency in factory employment is not an indication of lack of demand for factory products, but reflects the increasing efficiency of industry by which larger quantities of goods can be produced per worker. The extent of this advance in efficiency is evident from calculations of the Department of Commerce, which show that in manufacturing the output per worker averaged about 43 per cent higher in 1927 than in 1919. A large proportion, possibly the great majority, of the employees who have left factories have gone into other occupations, notably into distribution, into various forms of personal service, and into certain branches of transportation. The immense increase in the use of automobiles has caused the employment of hundreds of thousands in connection with their sale, repair or operation.

One of the most noteworthy tendencies during the first half of 1928 was the relative advance in prices of farm products as compared with other classes of products. The cost of living index and the retail cost of food were lower in the first six months of 1928, thus leaving to consumers a larger margin of purchasing power.

The foreign trade of the United States also continued in a satisfactory position during the first half of 1928. Exports were greater than for the first half of any year since the close of the post war boom, when price levels were much higher. The gain as has been usual in recent years, was chiefly in exports of manufactured goods which were 8 per cent greater in value than in the first half of 1927. Imports were slightly less in value in the corresponding period a year ago, and decidedly less than in the first half of 1926, but the declines are attributable to lower prices especially of silk and rubber. Eliminating the effect of lower prices there has been an almost unbroken upward tendency in imports ever since the war, due to the advancing buying power of consumers and the increasing demand of American industry for raw materials not produced in this country. The most striking feature of foreign trade this year, however, has been the exceptionally heavy exportation of gold which, in view of the large excess also of commodity exports over commodity imports, seems to indicate a still further expansion of the rate of American investment of capital in foreign countries.

# MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT and QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.

Charles M. Cadman

Mr. Cadman is President and General Manager
of the Pacific Lime and Plaster Company
of San Francisco, California

# BATESVILLE WHITE LIME COMPANY INSTALLS THREE NEW MODERN KILNS

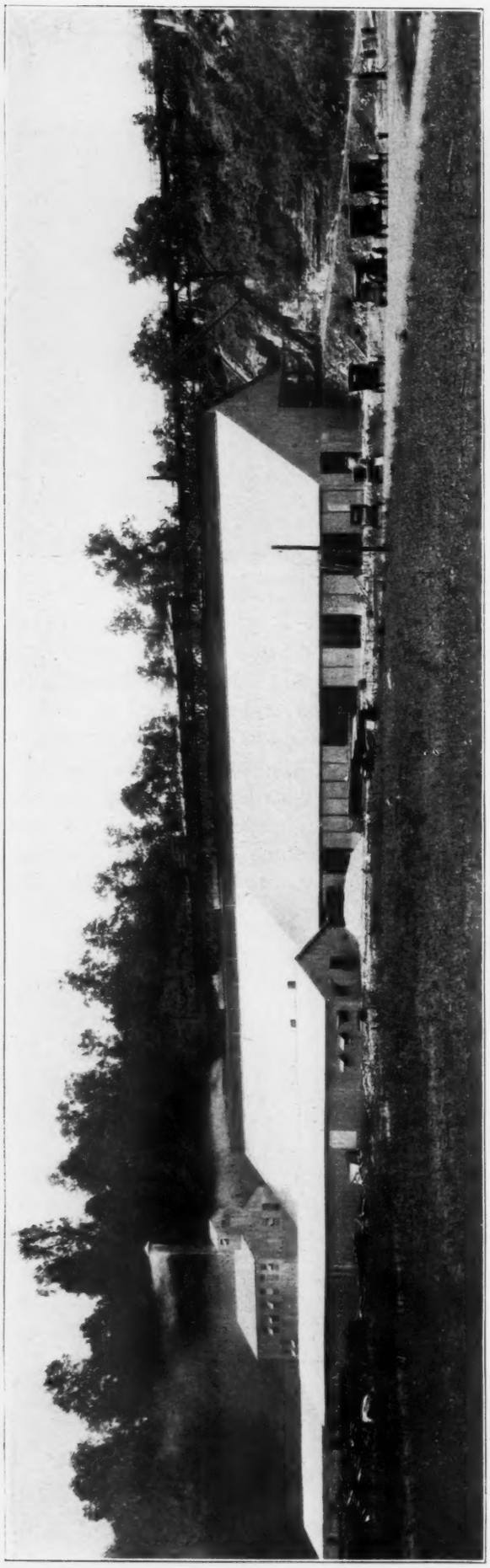
WITH three new modern kilns just completed at their already magnificent plant at Limedale, near Batesville, in Independence County, Arkansas, the Batesville White Lime Company has stepped its production up to seventeen hundred barrels a day. If the annual output was all barreled, and the barrels laid end to end, they would reach clear across the state of Arkansas. The new installation gives this concern a total of nine kilns. Six at their Limedale plant, and three at their plant at Ruddells, on the White River Division of the Missouri Pacific, in Izard County.

When the Batesville White Lime Company completed its new plant at Limedale, in March, 1925, officials of the company thought that they had built ten years ahead of the demand and that it would be at least a decade before they would have to install additional equipment to take care of their orders. A year after the plant was put into operation they had business enough to keep all departments comfortably busy, and the last two years they have had to keep all kilns in continuous operation to keep up with their orders. During the latter half of 1927 they were taxed beyond capacity, and in January started construction work on three new kilns, seven years ahead of the anticipated program.

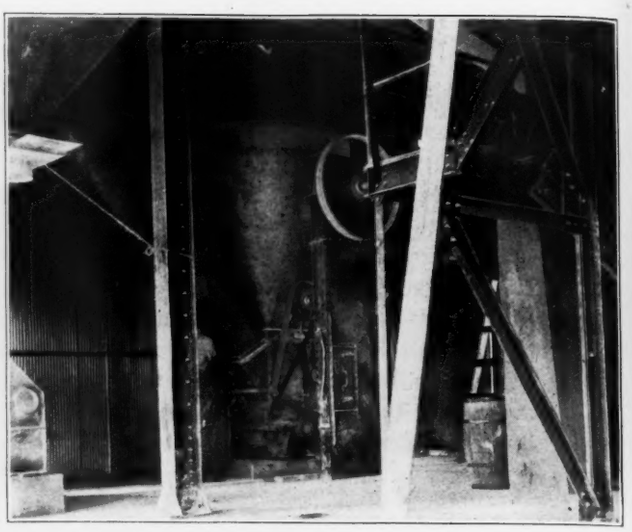
Two major factors have contributed to their success. One is quality. Before they constructed the Limedale plant in 1925, they investigated practically every limestone deposit in Arkansas, and did a great deal of other research work. They were determined to find a deposit of limestone that would make as near a perfect lime as could be made. This investigation not only covered an immense amount of field work, but laboratory tests and practical plant tests as well. After two years of investigation, they made their final decision, and took over the limestone deposit near Limedale, from which they are manufacturing Polar Bear lime.

View in Packing Department

Complete Battery of Kilns Before Roof Was Put on New Installation



Batesville White Lime Company's Completed Plant



View of Hydrator

Analysis of the stone made according to the official methods of the American Society for Testing Materials is as follows:

| | |
|---|---|
| Silica | 0.32 |
| All other insolubles | 0.06 |
| Calcium carbonate | 99.34 |
| Magnesium carbonate | 0.01 |
| Ferric oxide | 0.05 |
| Alumina | 0.19 |

This analysis shows less than three quarters of one per cent of all impurities. Initial orders for the product have in most cases developed regular customers. Another contributing factor to their success has been that Polar Bear lime is adaptable for chemical uses, vast amounts of it being used in the manufacture of paper by the southern mills.

The new installation consists of three shaft kilns, 6x10 on the inside, fifty feet high with a capacity of thirty tons a day each. They are fired with producer gas, two gas producers being located under each kiln. Coal is fed from the firing floor level directly into each producer. The gas is carried through ports under damper control, to self contained kiln furnaces, where air is introduced to complete combustion. The air for this purpose is supplied by two large exhaust fans, and conveyed through galvanized iron ducts to four torches on each kiln. The air torches are fitted with valves permitting very exact air regulation, and the combination gas and air is so controlled that it can be delivered in any desired quantities.

The three new kilns as well as the three old ones which are fired with wood, are equipped with two thermo-couples, and on the firing floor is an indicating pyrometer for use by firemen in maintaining constant temperature control. Recording pyrometers in the office make a continuous chart of kiln temperatures as a check on kiln conditions and the efficiency of the operator.

The burning operation is practically mechanical.

New Gas Producer End Kiln Under Construction

The Three New Kilns After Completion

Each kiln is equipped with a drag chain conveyor for drawing lime. These are driven by individual motors and the product can be delivered from the kiln to the cooling floor in minimum time.

At the time this article was written, the power plant had just been changed from oil burning combustion engines to electric motors. The total connected load amounts to 300 h.p., the current being furnished by the Arkansas Light and Power Company, which is just entering the upper White River territory. The 300 h.p. is utilized in the plant by fifteen individual motors. An auxiliary steam plant is kept constantly ready, in event of power failure.

There is probably no lime plant in the United States where mechanical operation enters so much into all departments as at this plant. The hydrating plant combines every new mechanical operation known to the industry. The product to be hydrated is first passed through a number one Sturtevant crusher, in which it is finely ground, then elevated by belt conveyor to a ground lime storage tank of seventy tons capacity. From this tank it goes into a six cylinder Kritzer continuous hydrator, where a pre-determined amount of water is added to insure perfect hydration. Tests are frequently made to determine that neither free lime nor free water goes into the finished product. Passing from the hydrator, the lime goes into a Raymond air mill, which by centrifugal force removes all foreign substances. From this machine the finished hydrate is passed into a fifteen ton air tight steel tank, from which it is fed by gravity into a four tube Bates packer.

The objections of practically every dealer served by the company have been overcome by the careful mechanical methods employed in packing lump lime. All the lump lime is dumped directly from the steel carts, in which it is hauled from the cooling floors, into a single roll crusher, which reduces it to a uniform two inch size. The two inch product is passed by belt conveyor into air tight steel tanks of three thousand barrel capacity, from which it goes by gravity to mechanical Howe packers, where it is bagged and barreled. The fines are all screened out of the lump product and are utilized by the hydrating plant. The advantage of this can be readily seen. Instead of a package containing dust, air slake and oversize lumps, it goes to the consumer in uniform size, guaranteeing better slaking qualities, which makes for a larger yield of putty.

The package products of the concern consist of crushed and sized quick lime in liquid tight barrels; crushed and sized quick lime in moisture proof, paper lined jute bags; hydrated lime in forty and fifty pound Kraft bags, and domestic hydrate in ten pound packages.

To insure perfect barrels for packing purposes, the company maintains a modern cooper shop, employing a large force of coopers, who make every barrel that Polar Bear lime is packed in.

The magnificent body of limestone on which the quarry of the concern is located is probably one of the largest and purest bodies of commercial limestone in the United States. It has a depth of 135 feet, and covers four hundred acres, which insures raw material for constant operations for almost an infinite period.

The Batesville White Lime Company was one of the first concerns of its kind to use a well drill to sink holes for primary blasting. The primary drilling is all done with a number four Keystone drill. This machine sinks a six inch hole from the top to the floor of the quarry face. These holes are heavily charged with dynamite, several are shot at one time, and bring down hundreds of tons of stone. The secondary drilling is done with Sullivan rotator drills, the air being furnished by a Chicago pneumatic compressor.

Whitcomb gasoline locomotives and two yard Koppel steel cars are used to move the stone from the quarry to the kilns. A four ton Whitcomb is

used on the quarry track for moving empties and assembling trains, and a sixteen ton Whitcomb does the heavy hauling between the quarry and the kilns, a distance of about two miles. This engine pulls a train of twenty cars, which averages fifty tons a trip.

The building which covers the new kilns and gas producers is constructed from concrete, brick and steel throughout, making it absolutely fireproof. This was the same type of construction used when the plant was built. The new installation gives them thirty-seven thousand feet of floor space in the plant building. The total investment now amounts to one-half million dollars.

## Living Standards of U. S. Affected By Timber Supply

The United States uses as much saw timber as all the rest of the world, and uses two-fifths as much of all woods as the rest of the world. In 1906 lumbermen cut approximately 280 cubic feet of wood from our forests for every man, woman, and child in the country. Now, however, with higher costs of lumber and of transportation, resulting in greater care in wood utilization, the forests are called on for only about 200 cubic feet per capita—about six times as much per capita as is used in western Europe.

The Forest Service of the United States Department of Agriculture presents such figures as these as arguments for the reforestation of much of our wood-growing area, and for the planting of even small areas on farms which would otherwise be unproductive. There is every reason to think that the per capita consumption of timber will decrease still further—will have to be decreased—but students of forestry see no indication that timber consumption will ever fall as low as it is in western Europe. It cannot be reduced to the present European level without serious disruption of many of our important industries and a lowering of our standard of living. The alternative is that prices must rise to a point where they make remunerative the systematic development of timber resources by scientific forestry. In many sections the men most conversant with lumbering are the leaders in the reforestation movement, not from sentiment or the idea of duty, but purely on a business investment basis.

## Ohio Gravel Pit Finds Mastodon Tusk

Workmen blasting in the gravel pit of the Red Bank Gravel Company, near Newtown, Ohio, recently unearthed one of the largest mastodon tusks ever found in that section. It was found about 50 feet below the surface and is about 8 feet long and 22 inches in circumference at the base. The curved end of the tusk has not yet been found.

## Cement Plants Break Safety Records

Working on the theory that reducing accidents makes for prosperity, the portland cement industry has completed another month of record-breaking safety in operation. Following the lowest accident month in its history, July mishaps numbered only 65 lost time and one fatal. June, 1928, set a record for the industry with 48 accidents causing loss of time and one fatality. July, 1927, recorded 103 mishaps and two fatalities. Thus with more mills reporting to the Portland Cement Association than last year accidents for the month of July were reduced 37 per cent.

In addition to making July of this year the safest July in the history of the business, the second quarter of 1928 has a lower number of accidents than any other three month period. Only two hundred accidents were suffered by cement mills and quarries located throughout United States and Canada during the past three months —10 per cent less than for any other similar period since accident statistics have been reported to the Association.

Figures further show that the first six months have been operated by cement mills with 15 per cent less accidents than ever before for a half year. The total accidents for seven months of 1928 are 618 lost time and 16 fatal—last year 789 lost time and 18 fatalities were suffered.

In addition to these unusual safety figures two cement mills have operated for over two years without accident. The Cowell, Cal., plant of the Cowell Portland Cement Co., and Newcastle, Pa., No. 3, of the Lehigh Portland Cement Co., are the mills reaching this high plane in safety work.

Thirty-eight plants in the cement industry have operated since January 1, 1928, without an accident involving the loss of time. These plants are still in the race to receive the Portland Cement Association safety trophy for a year's operation free from accidents.

## New Skyscrapers Use Concrete Units

For the first time in the history of the building industry concrete masonry units are being used throughout the entire construction of skyscrapers. The structures in which these units are being adopted are the Integrity Trust Building and the Bouvier Apartments, both of Philadelphia. These buildings are now under construction.

The Integrity Trust Building will, when completed, be 25 stories high, and contain 350,000 cinder concrete units, in addition to 1,000,000 concrete brick.

The apartment building, which is to be a 23-story structure, will have cinder concrete masonry units for back-up and fireproofing. Approximately 165,000 masonry units and 1,150,000 concrete brick will be used in the exterior walls alone.

# M. L. KERNAN CONTINUES TO CRUSH TRAP ROCK WHILE COMMUNITY CROWDS UP

**By George Ransom**

A QUARRY in a thickly settled district brings in problems of its own as well as advantages. It is a noteworthy fact that all the sand, gravel and crushed stone operations in the manufacturing and suburban sections of northeastern New Jersey have plenty of business, which certainly is a great advantage, but in numerous instances the residential sections have grown out to the quarries or very close to them, from which certain complications ensue. This of course is not strange, as the higher ground where the quarries are located is naturally attractive to the home builder. It is exactly what has happened to Mr. M. L. Kernan, who has a good sized trap rock quarry at South Orange, N. J., which he has been operating for the last twenty-three years.

Actually there are two quarries—one which has been abandoned and is now used for stock, and the one that is now being worked. A wall of rock has been left between the two so as to provide protection from blasting for the very fine residential section which is rapidly developing just below. In this way it is still safe to fire rather heavy shots.

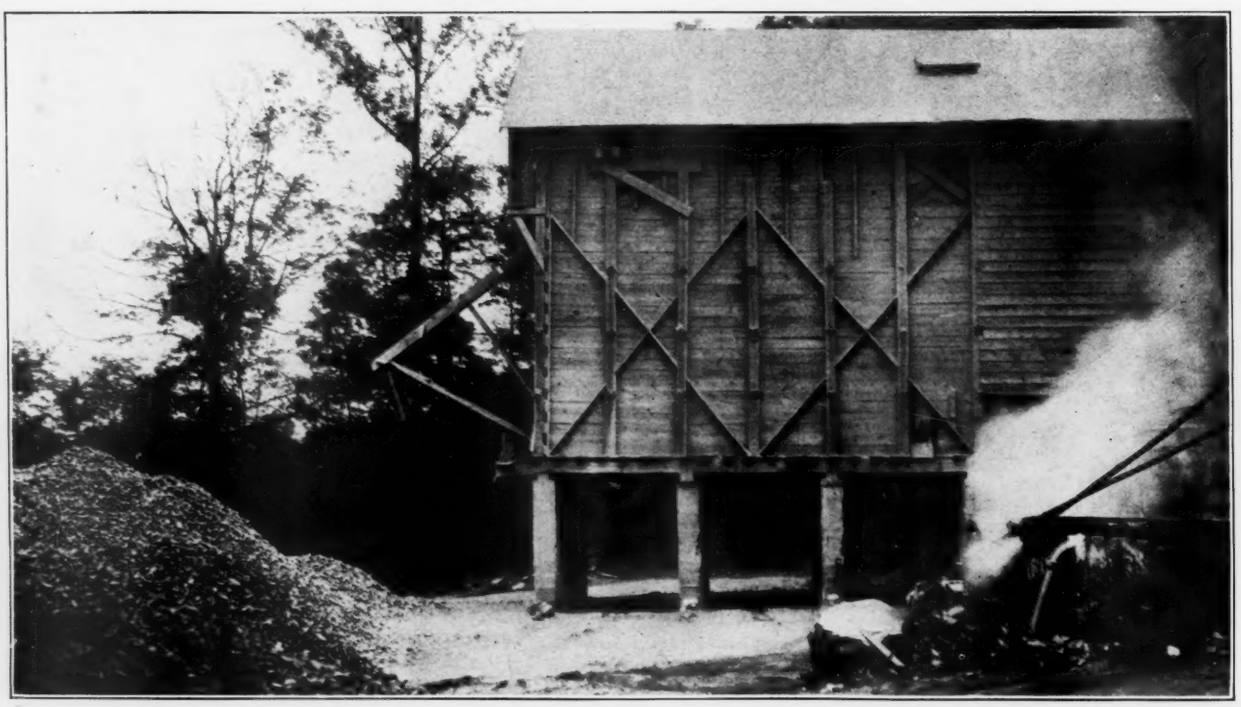
Drilling is done with two Armstrong well drills and a 75-A Thew Lorraine shovel is used at the breast to load stone into the two Autocar trucks which serve the primary crusher. These trucks have a remarkable record, as they have been in

Dumping a Load into the Batch Mixer

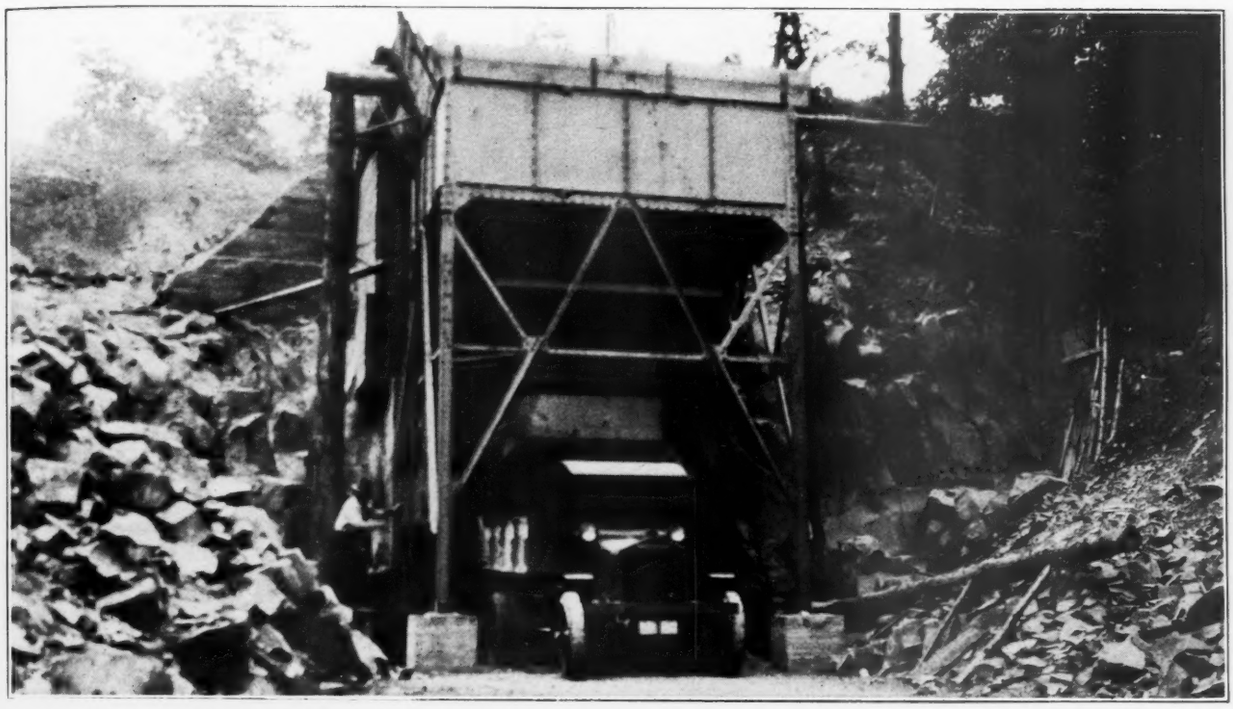
View of Plant, Showing Bins and Stockpiles

Breast of Quarry and Well Drill

Outside Conveyor for Tailings from Sizing Screens



Truck Bins and Stockpiles



Batch Mixer from Below

service for three years and travel from 100 to 125 miles per day with only a minimum of repairs.

The crushing plant is designed for a production of 500 tons per day. Quarry trucks dump the rock into the primary crusher, which is an 18 x 36 Farrell unit. From this it is carried on a Robins conveyor to the 13 x 30 secondary crusher, which is also a Farrell. From here it goes to the Farrell revolving scalping screen. The tailings from this screen drop to two 10 x 16 Farrell crushers, while the remainder passes through chutes to the 48 in. by 24 ft. sizing screen. The tailings from the sizing screen are carried on a Robins conveyor on the outside of the building to a 3 ft. Symons cone crusher which, together with the two 10 x 16 Farrell crushers, discharges onto a 20 inch Robins conveyor leading back to the sizing screen.

When Mr. Kernan started this quarry nearly a

Stock Piles in Old Portion of Quarry

Dumping a Load of Stone at Primary Crusher

quarter of a century ago he just had a 10 x 16 Farrell crusher, which is still in use, and one of the two mentioned above. In fact Mr. Kernan has had very remarkable service from his crushers, as is further instanced by the fact that his 18 x 36 primary crusher has not needed rebabbitting for five years. It is taken apart every winter and inspected, but so far it has not been necessary to make any repairs to the bearings.

One reason, aside from the fact that he has been economically minded enough to buy the best kind of machinery, is the great care which Mr. Kernan takes of his equipment. All bearings are carefully greased every morning and inspections are made every noon hour, when such attention is given as is called for. The plant is shut down in January, and during the winter all machinery is taken apart for inspection and all necessary repairs made. The result is that very little time is lost during the operating season due to breakdowns. In fact, last summer not a half day was lost. Another reason for this success is that great pains are taken to

Shovel at Stockpiles in Old Portion of Quarry

Quarry Shovel and Well Drill

secure good men, to hold them and to train them properly. The superintendent, L. C. Conklin, is a man who knows the plant and his men thoroughly, and is capable of handling anything that comes up.

Surplus stock piles are made near the bins and also in the old quarry. Stone for the Butler batch mixer is stored in the latter location. This mixer is so placed that the top is even with the floor of the quarry and trucks can dump their loads directly into it. A type O Thew shovel is used to load the trucks from the stock piles. Of course the mixer is loaded directly from under the mixer into trucks which come in over the regular driveway below.

This plant was developed at a time before electrical power from the central stations was available, and consequently a steam plant was installed. This is still in operation. The primary crusher is driven by a Frost reciprocating engine and the rest of the plant by a Watts-Campbell Corliss engine. Steam is supplied from an Ames boiler and a McCabe boiler. There are also two Worthington

Loading a Truck at the Quarry

pumps, one for the boiler feed water and to supply the crushers. Water comes from a deep well.

A Schramm portable air compressor with a Fordson tractor is used to supply air for drilling block holes and there is an extra Fordson tractor for general work around the plant. A Meyer truck scale has been provided.

Mr. Kernan has four White trucks equipped with Wood bodies and hoists. He was the first to have this combination, which he considers very satisfactory. There are also three Autocars, besides the two old ones in the quarry, which are also provided with Wood hoists. In addition to this Mr. Kernan has a Mack truck with a Huyl hoist. In other words, he is doing a good proportion of his own trucking and making the profit on it instead of letting some one else make it. This of course requires capital and the right kind of organization, but it has its advantages. The personal equation of the owner probably determines how great these advantages are.

## Accident Statistics Prove

During every 24 hours of 1928 an estimated average of 2,360 persons are being killed or seriously injured on the streets and highways of the United States. The estimated economic loss for the first six months of 1928 was $350,000,000 exclusive of small property damage and insurance premiums. At the present rate of increase the "Grim Reaper" will exact a toll of 40,000 human lives in highway accidents during 1935. These figures were part of an analytical highway safety report issued recently by the American Road Builders' Association.

During the first six months of 1928 the American Road Builders' Association estimates that 13,750 persons were killed and 412,500 seriously injured in highway accidents. The toll for 1927 was 26,618 killed and 798,700 seriously injured, a total of 825,318 casualties. At the present rate approximately 27,500 persons will be killed by the end of 1928.

What do these figures show? Do they indicate that the American people are becoming alarmingly careless at the wheel of an automobile or while walking upon the street? Do they mean that modern cars are too fast or too inefficient to be safely operated on our system of highways?

A careful analysis of highway accident statistics will show the latter to be largely untrue. The principal causes of highway accidents it will be shown, are discourtesy and carelessness on the part of both drivers and pedestrians. The statistics prove the following points:

1st. That the most important causes of highway accidents where motorists are principally at fault are in order of their importance—inattention, speeding, traffic law violation and intoxication. Of the 26,618 killed in 1927, motorists were at fault in 11,765 fatalities and all but 1,882 were attributed to the above causes.

2nd. That the most important causes of highway accidents where motorists are principally at fault are: children playing in the street or crossing in violation of traffic law, adult jaywalking, inattention, and confusion. Of the 11,367 deaths caused principally by pedestrians in 1927, all but 1,250 were attributed to these causes.

3rd. That adverse physical conditions such as wet streets, defective roads, poor lights and narrow streets, caused but 3,586 deaths.

4th. That the human factor is responsible for 95 per cent of all accidents.

5th. That the human factor which causes highway accidents is largely the result of certain definable physical conditions such as complex traffic laws, traffic congestion, discourtesy on the part of fellow motorists, carelessness on the part of fellow motorists, fatigue, physical incompetency, lack of confidence and the improper conduct of pedestrians.

6th. That approximately 60 per cent of all fatalities are pedestrians.

7th. That more than 30 per cent of all fatalities are children of school age.

8th. That accidents involving pedestrians continue to climb in number much faster than accidents involving only motorists.

The American Road Builders' Association has collected much data related to the causes of highway accidents. The organization has used, in addition, much information already made available by other associations interested in the safety problems. The road organization has launched as a result of its studies, a national highway safety campaign based upon what it believes to be the fundamental principles of highway accident prevention. These principles are in brief:

1st. That all cities and communities should undertake local campaigns to educate pedestrian traffic in the principles of courtesy and caution while on the public street or highway. The use of common sense is recommended in lieu of complex traffic rules.

2nd. That all states should adopt a system of examination and licensing of motor vehicle drivers.

3rd. That the adoption of the uniform codes of state and municipal traffic laws based on the report prepared by the National Conference on Street and Highway Safety is desirable.

4th. That the education of drivers in the principles of courtesy and caution should be undertaken in all communities.

# GOOD MANAGEMENT MUCH IN EVIDENCE IN THIS EASTERN PLANT

By F. A. Westbrook

THE plant of the Ashland Sand and Gravel Company at Ashland, Massachusetts, is noteworthy for its up-to-date equipment and efficient production. It is located in a region which has numerous deposits and where there is enough construction work to create a good demand. For stripping, an Erie steam shovel is used and the material is excavated with a one-yard Sauerman crescent bucket scraper. This scraper is operated by a Stroudsburg hoist, driven by a 50-h.p. Westinghouse motor through a Morse silent chain drive.

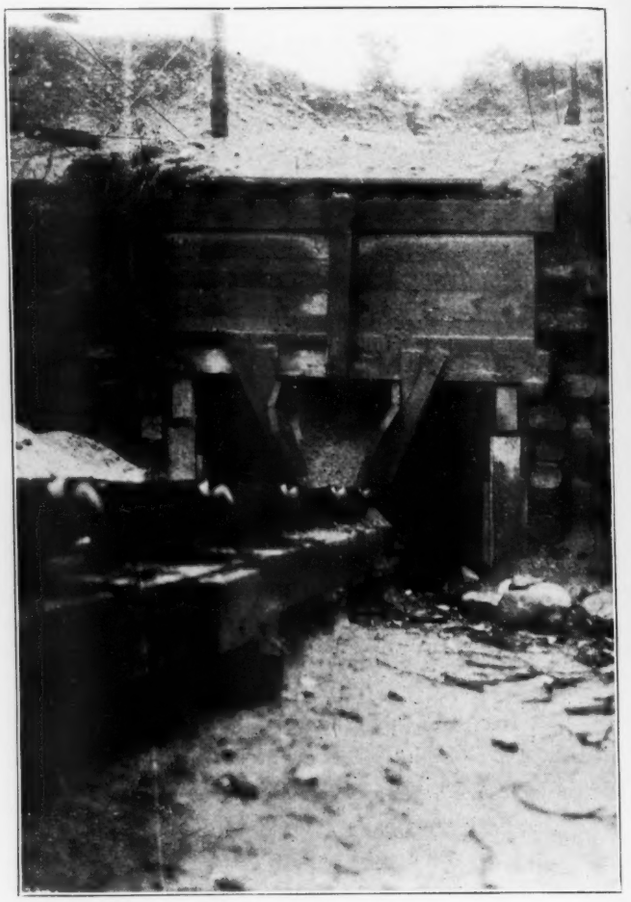
Bank material is scraped into a hopper, from which it is sent through a Link Belt reciprocating feeder at the bottom into the field belt conveyor. This is a 20-inch conveyor approximately 200 feet between centers. The idlers and head shaft were supplied by the Underwood Machine Company of Boston and the belt by the Boston Woven Hose Company. It is driven by a 15-h.p. motor.

At the end of the field belt, the material is discharged through a chute into a Good Roads Machinery Company scalping screen. The oversizes from the scalping screen drop into an American Machinery Company jaw crusher and then pass on to the main inclined belt conveyor at the top of the plant together with the throughs from the scalping screen. This is also a 20-inch conveyor, about 175 feet between centers, with Link Belt idlers and head shaft and a Goodyear belt, driven by a 15-h.p. Westinghouse motor.

Drag Bucket and Bank

Hoisting Engine for Drag Scraper

Crusher Under Scalping Screens



Back End of Field Conveyor

There is a Good Roads cylindrical revolving sizing screen at the top of the plant, which is 20 feet by 42 inches in size. The gravel and crushed stone drop into bins for the various sizes and the sand is washed through a chute into a Caldwell screw log washer, which the owner says is a satisfactory piece of equipment and has never given trouble.

From the log washer, the sand is washed down over a series of home-made screens made of wire mesh supplied by the Newark Wire Cloth Company. Additional water is applied at each successive screen. The sand is thus separated into three grades—brick, plaster and concrete. The screen and log washer are driven by a 5-h.p. Westinghouse motor. The three grades of sand pass into bins, but at times there are considerable surpluses which are stored in stock piles. These stock piles

General View of Plant Showing Belt Conveyor at Left and Troughs at Right

Field Conveyor with Main Conveyor in Background

are made by diverting the streams from the stationary screens when the bins are full.

Dirty water from the washer is carried away through a trough to a section of ground lower than the plant. The boundaries of this piece of land have been dyked to prevent the water from running down on an adjacent property. A drainage line to a natural water course has been made and the settling from this dirty water is very nicely filling in front of the dyke.

The water for washing is pumped 1,500 feet and against a head of 148 feet from the Cold Spring brook by a 6-inch Gould centrifugal pump driven by a 25-h.p. Westinghouse motor. Another smaller Gould centrifugal pump is used as a sump pump to keep the ground around the plant as dry as possible.

All shipments are by truck, as there is no convenient opportunity to have a railroad siding, because the plant is not located near enough to the railroad. Trucks may be loaded either directly from the bins or from the stock piles. In the latter case, a Barber Greene loader is used. Mack trucks with Wood hydraulic hoists are used for heavy deliveries and Ford trucks for light deliveries.

It is quite in keeping with this up-to-date equipment that the plant is kept clear of litter, discarded machinery and odds and ends of cables and small piles of oversized stone and gravel. In other words, the whole plant presents a most definite impression of orderliness and good management.

## Rents Lowest Since 1920

Rents in the United States now are the lowest since 1920, latest data of the U. S. Labor Department reveal. Housing accommodations cost approximately four per cent less this year, by comparison with 1913, than in 1927 it is shown. The present rent average is 58 per cent above pre-war. Last year a 62 per cent rise was reported.

The 1928 level is found to be seven per cent lower than in 1926 and nine per cent less than in 1925. It is ten per cent under the high mark set in 1924.

Rentals began to climb in America toward the end of the World War. In the latter half of 1918 they averaged nine per cent higher than in 1913. In 1919 they rose to 14 per cent above the earlier year, and in 1920 to 35 per cent above. The peak of the post-war rise came in 1924 when the level stood at 68 per cent above the 1913 mark.

The study of rents is made by the Labor Department in connection with its half-yearly investigation of living costs in the United States. Data reported are based upon information gathered in 32 representative cities. The rental curve derived from the Department's figures is considered to reflect the trend of housing costs in the country as a whole.

## Seventh National Exposition of Power and Mechanics

The Seventh National Exposition of Power and Mechanical Engineering will be held at the Grand Central Palace, New York, December 3-8, 1928. It provides industry and engineers an opportunity for comparison of similar products and is the means of increasing old business and adding new customers.

More than 450 reservations have been made, which indicate the scope and support the manufacturers lend yearly to this central display in the Power and Mechanical Equipment field. Engineers attending the annual meeting of the American Society of Mechanical Engineers spend much time inspecting and comparing various types of equipment adapted to their particular industry. The registration of executives and buying officials increases each year, and from all parts of the world come requests for information on various types of equipment exhibited. Every industry is directly interested in some form of mechanical appliance that will be shown at the Seventh National Power Show.

# PREPARATION OF SLAG FOR THE MARKET

THE National Slag Association of Cleveland, Ohio, has published number 6 of a series of Symposiums on blast furnace slag. This booklet contains abstracts describing the processing of crushed, granulated, honeycomb, fork, pancake, sculptural and artificial slags; the processing of artificial pumice; the aging and production of blast furnace slag; and flow sheets of these processes. Blast furnace slag is described as the non metallic product, consisting essentially of silicates and alumino-silicates of lime, which is developed simultaneously with iron in a blast furnace.

## Processing of Air Cooled Blast Furnace Slag

The processing of slag, as far as the slag plant operator is concerned, begins when the molten slag leaves the furnace. From the furnace the slag follows one of two courses: either flowing directly through runners to slag pits adjacent to the furnace, this method being known as the pit system, or being conducted into large ladles mounted on railway trucks in which it is conveyed to a more distant point for disposal. The latter operation also may take one of two forms. In the modified pit system the slag is poured into well defined pits, served by permanently located pouring and loading tracks, from which it is regularly excavated. The other method is called the bank system because the molten slag is poured over a plot of land with no very definite attempt to control the depth or width of the mass of solid slag so formed which sometimes contains thousands of tons.

Modern practice favors either the pit system or modified pit system, each of them having some advantages. The pit system requires only a small portion of the area required by the modified pit system but that area must be contiguous to the furnace, which is not always possible. The bank system requires large areas of land and has other disadvantages which are making its use obsolescent. Its chief advantage is that furnaces can be operated throughout the entire winter months without necessitating the operation of the slag crushing plant while in the pit system, and to a lesser extent in the modified pit system, the crushers must be in operation almost continuously due to the limited capacity of the pits. These pits vary in size from those poured full in a few days to those requiring 4 to 6 weeks to fill.

In all of these systems the slag is excavated by a shovel or other means, this being slightly easier in the pit systems because the slag solidifies in layers separated by weak lines of cleavage and because of the fact that the pits are generally of such width that one cut of the shovel takes out the slag from the entire width of the pit. Regardless of the method of handling, however, the slag eventually reaches the crushing and screening plant, usually in dump cars or standard railway cars. It is then dumped from the cars into a large hopper and is fed by a plate feeder onto a conveyor belt or elevator which carries it to the screening plant.

The conveyor plant, or elevator, as the case may be, discharges into a scalping screen or grizzly where the smaller sizes are removed and the oversize is passed directly into a crusher, generally of the jaw or gyratory type, the scrap and tramp iron first being removed by a magnetic separator or by hand picking. The crushed material then passes to an elevator, the iron released by the crushing process being removed by another magnetic separator, and together with the iron removed before crushing, returned to the blast furnace and reclaimed.

The material passing through the scalping screen is elevated and passed over a magnetic separator to a grizzly. The oversize from the grizzly then goes to revolving screens which separate it into the required sizes. The material passing through the grizzly and the revolving screens is elevated and separated by a revolving screen into the smaller commercial sizes. Vibrating screens are used where very fine material is required.

The foregoing process of crushing and screening is merely a typical arrangement and can, of course, be worked out in many different ways to suit conditions at different plants. Descriptions of many systems of processing slag are presented, including methods used in typical American, British and German plants.

Dr. A. Guttman, research director of the Eisen Portland Association, Dusseldorf, Germany, in "Use of Slag in the Building Industry," 1919, presents some data on the processing of blast furnace slag in Germany. Methods employed in Germany are very similar to those prevailing here except that more of the processing is done by manual labor. Methods described also show that English methods are very similar to those used in this country.

## Processing of Experimental Slag

Numerous attempts have been made, in America and elsewhere, to manipulate the processing of molten slag in such a way that the solidified slag would possess certain physical characteristics. Cast slag brick, which is very hard, tough and heavy, and whose wear under traffic is practically negligible, is one of the results of these attempts. In Germany the molten slag is cast into molds and the bricks while red hot are put into a beehive oven where they are annealed by their own heat.

E. J. Winkleman, chief engineer of the Duquesne

Slag Products Company of Pittsburgh, in a paper, "German Blast Furnace Slag Operations," presented before the annual meeting of the National Slag Association, June 8, 1928, describes another method used in a German plant. Paving and other blocks are poured in beds located alongside the ladle track. The bottoms of the beds, which are about 6 feet wide by 30 feet long, are covered with 1½ inches of ½ inch crushed slag. Each bed is filled with a series of sheet iron molds which are covered with plates having 3 inch holes through which the slag runs into the molds. Sufficient slag is then poured to not only fill the molds but also to cover them to a depth of 4 to 8 inches, this top layer serving to anneal the blocks. They are allowed to cool for about six days, the slag on top of the blocks then being removed to the crushing plant and the blocks put in stock piles.

Similar results have been achieved in this country by very different methods. The slag, after pouring, was subjected to rapid chilling and cooling and became very dense and compact. P. J. Freeman in "Blast Furnace Slag as an Aggregate," published in "Iron Age," April 14, 1927, describes a very dense slag which has been successfully made by this method. The finished product weighed over 100 pounds per cubic foot and had an absorption of less than one per cent.

## Processing of Fork Slag

The Carnegie Steel Company, in a booklet, "Blast Furnace Slag," published in June, 1921, describes a method of producing forked slag. The slag as it comes from the furnace is poured into long narrow trenches formed in sand, where it is allowed to cool. When cool enough to be handled it is broken up with sledges, the larger pieces being loaded by hand and the smaller pieces forked into cars to be hauled away for seasoning.

## Processing of Pancake Slag

The booklet, "Blast Furnace Slag," also describes another method now in use. The slag first runs from the furnace into a reservoir and is poured from the reservoir into a machine with large flat molds 20 inches by 45 inches by 2 inches deep which travel on an endless chain conveyor. Before dumping, the slag is cooled by sprinkling with water, this cooling cracking the sheets of slag and causing them to break into small pieces when they fall into the car. Much of this slag is used as concrete aggregate. The reservoir is necessary to this process because the machine cannot be speeded up to handle the output of the furnaces at pouring time, but must be fed at a regular rate, otherwise the slag would become granulated on leaving the machine.

## Processing of Honeycomb Slag

Another type of air cooled slag called honeycomb slag is described in this booklet and is the result of experiments to lessen the weight of the slag without decreasing its strength. A slag has been produced that weighs only 30 pounds per cubic foot and will make concrete weighing as little as 105 pounds per cubic foot. The molten slag is poured into a tank 40 feet by 120 feet by 6 feet deep, the bottom having first been cooled, cleaned and dried, the pours being made in layers of 6 inches each. Each layer is sprayed with water, cleaned and dried before another layer is poured. After the pit is filled the slag is broken up, excavated by a shovel, crushed, and graded into the various commercial sizes.

## Processing of Sculptural Slag

Dr. A. Guttman found that by processing molten slag in a certain way it could be worked on with hammer and chisel in the same way as other stones used in sculpture. The small pores found in ordinary slag which have no effect on its durability for most purposes have to be eliminated when the slag is to be used for sculpture. This is accomplished by subjecting the slag, while still liquid and glowing, to the same refining and cooling processes in the reverberatory kiln and cooling chamber that are customary in glass manufacture. Treated in this way, slag can be furnished in rough blocks to be worked up or it can be cast into molds while still in the fluid state.

## Aging of Slag

Processing of air cooled slag for the market usually involves cooling for periods of time varying from a few days to several years, the length of time depending entirely on the size of the pit or bank and on the demand for the product. Numerous tests, among them those conducted by P. J. Freeman, chief engineer, Bureau of Tests and Specifications, Allegheny County, Pennsylvania, show that concretes made with slags from 3 days to 15 years old show no difference in their compressive strengths.

## Production of Slag

Fred Hubbard, consulting engineer, in a paper, "Manufacture of Slag," presented at the University of Michigan, January 7, 1926, states that the production of one ton of iron in American blast furnace practice is accompanied by that of ½ ton of slag. The materials necessary to produce these amounts are as follows: 4,400 pounds iron ore, 2,100 pounds coke, and 1,200 pounds flux stone.

Raymond Harsch, testing engineer, U. S. Bureau of Public Roads, in the 1923 Proceedings of the A. S. T. M., showed that in 1919, 29 slag plants throughout the country had a combined daily capacity of 31,000 tons, which has of course increased greatly since that time. Dr. A. Guttman estimated that 19,000,000 tons of slag were produced in Germany in 1913, and S. J. Pearson, of Wm. Shep-

herd's Sons, Ltd., Rochdale, England, estimated 12,000,000 tons for Great Britain in 1926, but neither of them gave any figures on the amount used commercially.

### Processing of Water Granulated Slag

The difference between granulated slag and air cooled slag is generally understood to be that the former is water cooled while still molten, while the latter is slowly air cooled. Because of the fact that granulated slag can be produced by air cooling a better definition is that granulated slag is a product of rapid, almost immediate cooling, while air cooled slag is the result of a much slower process. Several agents have been used to granulate molten slag, water, air, steam and milk of lime, but water is the most commonly used.

The Carnegie Steel Company in the booklet, "Blast Furnace Slag," describes two granulating processes in which water is used. By the open tank method granulated slag is formed by running the molten slag directly into a tank or pit partially filled with water, contact with which causes disintegration. This product contains many light fluffy particles as well as denser ones. In the improved water jet method the molten slag is delivered from the furnace through a trough to a concrete pit. At the edge of the pit the trough takes the form of a large nozzle fitted with an annular tube from which water issues in the form of a spray under 30 to 40 pounds pressure. This causes disintegration and partial cooling, which is completed by contact with the water in the pit. The granulated slag produced in this manner resembles that made by the open tank method except that the largest particles are much smaller and the entire product is somewhat more dense.

### Processing of Artificial Pumice

Artificial pumice, or "thermosite," is a blast furnace slag which has been developed in Germany. It is used as an insulator, both alone and in concrete, and as the aggregate in a building material called "blast furnace float stone." Dr. A. Guttman, in describing the method of manufacture, says that the glowing liquid slag is allowed to glide upon the surface of boiling water forming pumice-like, highly porous pieces of slag. This method is another variant of the water granulation process.

### Processing of Artificial Slag

Dr. H. Passow, cement expert, of Hamburg, Germany, in "Introduction of Slag into the Cement Industry" published in 1908, describes a process of producing slag without manufacturing iron which was at that time in use near Marseilles, France. Marl is smelted in a kiln with about 36 per cent clay content. A white hot stream of slag is produced which is then granulated and ground. This slag, mixed with German Heidelberg cement, gave strengths which surpassed that of standard Portland cement at that time. The Association of German Portland Cement Manufacturers recommended this slag as a substitute for blast furnace slag in districts where there were no blast furnaces.

### Processing of Steam Granulated and Air Granulated Slag

Granulation of slag has also been accomplished by means of a jet of steam or a jet of cold air. Vitreous slags, according to Dr. H. Passow, are obtained by conducting the molten slag direct from the furnace either into cold water or into spray with air or steam. By following the spraying with the cooling process small round balls were formed.

Dr. Passow described a method used in Germany in which an air stream turned the slag into spray. The red hot slag was poured upon a vertical truncated rotary cone which was hollow and contained pipes through which the air was blown. The air stream and the speed of rotation could be regulated, thus regulating the cooling of the slag.

Another apparatus described by Dr. Passow consisted of a slowly rotating funnel whose ridged inner surface was cooled by water from below, the liquid slag flowing slowly and cooling in thin layers which were removed by a set-in scraper.

A. M. Thackara described another device in which the molten slag flowed into a cast iron beaker with double walls between which cold water was kept flowing. The slag granulated on contact with the cool inner wall.

### Conclusion

The processing of slag from the time it leaves the blast furnace summed up briefly is as follows:

(1) It may be suddenly chilled and solidified by water, air or steam, the former being more commonly used, producing granulated slag.

(2) The slag may be run from the furnace into ladles or troughs and transported to a bank or pit where it cools. This form of slag is called air cooled blast furnace slag and has a hard dense texture. It is then excavated, crushed and screened in preparation for its use as concrete aggregate, roofing aggregate, railroad ballast, road material, and many other uses.

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## A New Use for Cement

The United States Steamer, Vega, recently returned from a trip into the Bering Sea with a cargo of seal pelts. Part of the cargo which it had taken into the north was 300 tons of cement to be used in the construction of concrete igloos for the natives to live in. These structures have generally been made of snow, heretofore, although stone is used when available.

# SPLENDID TRUCK SERVICE KEY TO SUCCESS OF ARIZONA SAND AND ROCK COMPANY

Showing Crushing and Screening Plant

THE Arizona Sand and Rock Company, Phoenix, Arizona, came into the field at the right time and has been giving a service that fully meets the demands of the rapidly expanding community, with the result that the plant has been increased in size and capacity three times in the past two years. There are now operating three crushers, two elevators and hoist, and the big set of rolls is kept going at capacity load to supply the steadily increasing orders. A 15,000 yard storage pile takes care of the overrun and affords the necessary flexibility to the plant.

D. W. Kelley, president, and J. H. Perkins, vice president, are both actively engaged in the management of the company. Mr. Kelley acts as general manager and Mr. Perkins as plant superintendent.

"We have been particularly fortunate in the uniformly high character of the materials developed in our beds," says Mr. Perkins, "and we are now down to a depth of 50 feet in good sharp sand with river boulders of an even size, easily worked and meeting every demand of the builders".

Beginning operations with thirty acres of river

Section of Conveyor with Bins and Stockpiles

bottom on the Salt River just south of Phoenix, the company has increased its holdings to 190 acres, about one-third of it being in the river bed. Workings at 25 feet below the water level show a very high quality of material and the normal water flow has been definitely stopped by the Roosevelt and Mormon Flats and Horse Mesa dams, further up the river. Small dykes have been erected on the company's property to take care of any small flow in times of excessive rainfall, so that what is practically an inexhaustible supply of sand and gravel is permanently available.

A Sauerman drag line is used in making excavations and three pits are at present in operation. A Madson box in the big bin makes it possible to load the trucks with a proper mix, just as the contractors want it for use. The trucks operated under the name of the company and bearing the Arizona Sand and Rock Company's name are all owned by the drivers.

"Our haul is practically all over paved roads and 90 per cent of our materials are delivered within a radius of 4 miles, making a most attractive haul for the owner operator, because we can give him constant employment with the best possible facilities for loading," says Mr. Kelley, "and we are, accordingly, able to make contracts that are very satisfactory to the company.

"In addition, we have an agreement with a well-equipped trucking company, whose fleet numbers 35 units, to take care of our business on a moment's notice when a special rush warrants it. This combination makes it possible for us to guarantee delivery absolutely and, with our big reserve pile and modern loading facilities, it is all just as easy as selling sugar over the counter. Our delivery system has been one of the important factors in our success."

The big bulk of the company's business has been to supply the numerous concrete mixers that have been engaged during the past 18 months in converting Phoenix from a desert village to a modern city. In meeting this demand, the uniform run of sand and gravel, delivered in trucks that carry eight yards each and drop the materials in high compact piles, can be counted as covering the big percentage of the firm's activities, but a big order for ballast used in reconstructing the city's electric railway lines was included in this year's business, as were several large orders for railroad shipment to other parts of the state.

## Bauxite Resources of Jugoslavia

Jugoslavia possesses extensive depostits of bauxite, found mainly in the vicinity of the Adriatic Sea—on the islands, and in Dalmatia, southern Croatia, Herzegovina, Montenegro, and Slovenia. All the ore beds have not been surveyed to date and no exact estimates of the deposits are available, but they are unofficially reported to have reserves in excess of 50,000,000 metric tons. The most important deposits are found in northern Dalmatia in the neighborhood of Drnis and in Herzegovina, near the Mostar-Metkovic railway line. Great quantities of bauxite ore also have been discovered recently in Montenegro, between the towns of Bar and Ulcinj.

In Croatia the deposits in the county of Lika are the most important, but they are not exploited at present owing to the large content of impurities in the ore. The deposits in Dalmatia are plentiful and the quality is much better, the ore having only about 0.25 to 3 per cent of silica. Similar conditions exist in Bosnia, while the Herzegovinian bauxite, especially that found in Citluk, is even better than the bauxite of Dalmatia. The Herzegovinian bauxite is not exploited at present on account of poor means of communication.

The bauxite ores in Jugoslavia are relatively rich, regardless of the silica which they contain. The alumina content ranges from 53 to 66 per cent. Their exploitation did not begin until during the war, when the Central Powers were compelled to search for a substitute for copper. In 1915 the exploitation of bauxite was begun on the island of Rab and 13,400 metric tons of ore were obtained that year. At the same time exploitation was begun on three other islands, and finally at Drnis, where several companies were organized in 1920 and 1921.

Since the war exploitation developed to such an extent that in 1925 Jugoslavia held fifth place among the bauxite-producing countries of the world, furnishing about 9 per cent of the world's production, exclusive of the United States, and in 1926 it rose to fourth place. There has been marked fluctuation in the Jugoslavia annual production—from only 1,213 tons in 1919 it rose to 19,117 in 1920, declined again in 1921, reached 31,290 in 1922, fell to 18,485 in 1924, and then rose suddenly to 79,032 in 1925. There are no figures available for 1926, but the output considerably increased that year, as the two companies of Drnis alone produced 120,000 tons.

All the bauxite produced, with the exception of a small quantity manufactured at Moste, is exported to foreign countries. Annual exports rose from 281 tons in 1920 to 39,315 in 1922, declined to only 26 kilos in 1924, and then advanced to 53,704 tons in 1925 and 96,714 in 1926. The United States took 34,200 tons of the 1925 exportation; 10,400 tons went to the Netherlands; 8,550 to England; 500 to France; and practically all the remainder to Norway. In 1926 the United States received 62,700 tons; the Netherlands, 28,270; Germany, 5,700; and Hungary practically all of the remainder. The quantity exported to the United States in 1926 was double that in 1925, but fell off greatly in 1927.

# PASSING FROM ONE METHOD TO ANOTHER KANSAS PRODUCER MEETS CONDITION

Hydraulicking the Overburden

THE Washington County Sand and Gravel Company is operating a washed sand and gravel plant on the banks of the Little Blue River near Hanover, Kansas. The location is only a few miles from the Nebraska border in the east central part of the state and is on the Odell, Nebraska, to Concordia, Kansas, branch of the Chicago, Burlington and Quincy Railroad and near the St. Joseph and Grand Island Railroad main line. John Westover is in charge of operations.

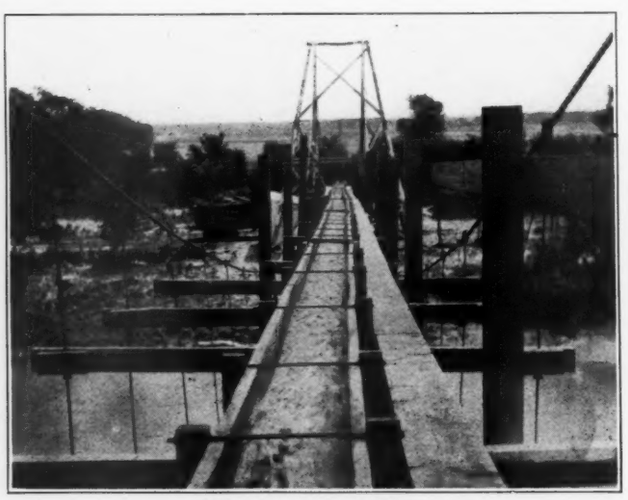
The property consists of 62 acres of glacial drift sand and gravel with a depth of from twenty to seventy feet lying on a bed of shale which is about forty feet above the normal river level. The drop

Loading Material at Right, Refuse Passing at Left

Head End of Flume for Refuse

from the top of the shale to the loading track is 28 feet and the distance of the track from the pit is 330 feet.

The pit is being worked by the hydraulic method which is being used to remove the top twenty feet of the deposit. Due to natural conditions it will then be necessary to discontinue this method and a drag scraper will be installed next year to excavate the material to the top of the shale. The pumping equipment is located in a section of the river bed which has been dammed off from the main stream, a sluice gate in the bottom of the dam regulating the amount of water to the intake of the pumps. The pumping equipment consists of an 8-inch Fairbanks-Morse centrifugal pump driven by a 65-horsepower Waukesha motor and a 3-stage Union steam pump attached to a 100-horsepower electric motor, the latter unit having recently been installed. The two units have a combined capacity of about 2,300 gallons per minute.



Flume Across Bridge

A wooden box type flume carries the material from the pit to the plant on the opposite bank of the river. A 190-foot span cable suspension bridge, supported on each bank by a wooden tower, carries the flume across the river. The flume has a grade of about 6 per cent, which has been found to give the best results with the material. A walk underneath the flume is also suspended from the bridge by a wooden framework. The material on arriving at the plant is washed and graded by raking it over a set of stationary screens, the washing water and waste running through another flume back into the river and the washed and graded material being loaded direct into railroad cars for shipment.

## $10,904,760 Loan for Highways in Chile Proposed in New Bill

A bill has just been introduced in the Chilean Congress, which will probably receive early approval, authorizing a loan or loans up to 90,000,000 pesos ($10,904,760), the proceeds to be placed in a fund for the construction and improvement of a system of roads throughout the Republic. The loan will be issued in three annual installments.

# METHODS OF COMPENSATING SALESMEN

By J. J. Berliner

THERE is no single method of compensating salesmen that will work equally well for all types of salesmen, all types of business or fit in, under varied conditions of selling. However, there are certain elements relative to compensation that must be considered. These are as follows:

1—A subsistence salary.
2—A commission for sales above a set quota, such commission to be graded by the net profits to be realized.
3—Bonuses for unusually good performances—the bonuses for reductions in selling expenses being of timely importance.
4—Penalties for slovenly performances.
5—A money equivalent for all services the salesman renders.

In general, the method of compensation should be designed to develop the best efforts of salesmen, to provide for their living and business expenses and something besides, all at an expense in line with the present day demand for lower costs of distribution.

The following is the method of compensation in use by one large concern:

1—A salary payable monthly is established at the beginning of the year for each salesman by the manager of the branch to which the salesman is attached. The factors considered by the manager in establishing the salary are as follows:

I. Personality:
  a. Initiative
  b. Aggressiveness
  c. Industry
  d. Habits
  e. Magnetism

II. Knowledge:
  a. Product
  b. Company Policies
  c. Other valuable information

III. Sales Accomplishments:
  (a) Total Sales Compared with Potential Sales.
  (b) Company Brand Merchandising—Making of Company. Brand Merchants. Orders for Advertising—Window Display—Installed Price—Publicity.

IV. Probable Future Value to Company.

Furthermore, the sum of the total salaries must be such as may be included equitably in the operating budget established for each branch at the beginning of each year by the general manager of sales with the approval of the president.

2—In addition to the guaranteed salary, a commission is payable to each salesman, which is determined as follows:

a. Sales quotas for all articles are assigned to each branch. Each quota is fixed at approximately ten per cent less than the sales expectancy for each branch.
b. Sales results for each article or product are weighed with the price thereof and thereupon total percentage of results to the sales quotas for each month is determined.
c. Sales quotas are announced at the beginning of each half year and the results computed at the conclusion thereof respectively.
d. At the end of the first half year announcement is made to each branch of the results accomplished.
e. At the end of the calendar year, which is also the fiscal year, sales results compared to the sales quotas for the entire year are computed.
f. Thereupon there is paid to each salesman a commission determined by the percentage by which sales results for the year exceed sales quotas for the entire branch. This percentage of each salesman's results is paid to him as his commission for the branch results which have been obtained.

## I.—By Salary

1—Secures adherence to sales principles of the house.

2—Allows for proper degree of development of missionary work.

3—Easy to compute, eliminating a lot of clerical work.

4—Has authority of long usage.

5—Leaves the house free to transfer salesmen to other salesmen.

Disadvantages of Method:

1—Salesmen often growing dissatisfied when salaries are not raised frequently.

2—Does not stimulate the salesman to his best efforts. In different fields, some concerns have found that by changing from salary to a commission basis, the salesmen's business improved; on the other hand, other concerns found the reverse more beneficial. When they changed from a commission to a salary basis, better work was the result.

## II.—By Commission

Advantages:

1—Compensation is measured directly by the results.

2—The risk and responsibility is placed upon the salesmen.

3—Salesmen are stimulated to harder work, so as to increase their income.

Disadvantages:

1—Relation of salesmen to house is apt to be distant.

2—Encourages overselling to the neglect of service and missionary work—calling on prospects.

3—Too much is earned by the salesmen in periods of prosperity and too little in times of depression.

4—Difficulty found in determining a proper rate of commission.

Very frequently with the best of intentions a company and a salesman enter into a commission arrangement under which in almost every case the remuneration turns out to be either too small or too large. If it is too small, the salesman is dissatisfied and it must soon be increased. If it is too large, the salesman is still more dissatisfied if it is reduced, and yet if it is not reduced, the salesmen in position of like importance are dissatisfied.

## III.—Variations in Method

1—Straight commissions—A fixed percentage paid on all sales.

2—Sliding commission—Commission percentages increased as definite sales totals are reached.

3—Group commission—Merchandise is divided into groups each carrying a different rate of commission.

4—Commission and d r a w i n g account—either guaranteed or applied against earnings.

There is a growing realization of the necessity of allowing a salesman a regular and fixed income, not large enough to encourage loafing, but sufficient to cover living and business expenses. This holds true particularly for new men, or old men working new territory.

Thus one company has found from years of experience in handling specialty salesmen that the commission plan of compensation with a weekly drawing account has proved most satisfactory. This concern requires the salesman to establish a credit balance before they draw more than their weekly drawing account and while debit balances may run to considerable figures on men temporarily not producing, the conditions existing must be taken into consideration before discharging the man on this account. When sales come hard, it is necessary to be a little more lenient in this respect than at other times, and the purpose and value of the drawing account is to relieve the worry incidental to a straight commission basis and assuring a man a weekly compensation on which he can rely.

5—Salary and commission on Sales over Quota.

An illustration of above is the practice of one company who pay a moderate salary on an amount of business which they think the territory should yield, and then give him a commission for any sales over and above that volume. In effect, the salesman must do a given amount of business to earn his salary and hold his job and he shares in any sales above this minimum.

Where quotas are fairly set, salesmen are wont to enter into this arrangement enthusiastically.

## IV.—Bonus and Other Additional Rewards

The bonus is not a method of compensation but an additional reward for particularly meritorious service, given over and above salary or commission.

The bonus is given for a great variety of performances. It may be given for the largest volume sold in dollars or quantity, for the largest increase in percentage of available business or for the best record of outstanding accounts. A company desiring wide distribution may offer bonus for the most calls made, for the most customers sold, or for the greatest number of new customers added. A firm desiring to encourage new salesmen may give a bonus for the best record of the salesman employed by them for two years or less. Additional compensation may be given also for selling slow-moving merchandise, seasonable specialties, package versus bulk goods, company brand in contrast to outside merchandise.

A form of bonus that has much to commend itself is that granted for a saving in the percentage of selling expense. A selling percentage is fixed, based upon the actual experience of prior years, and any saving of actual over allowed selling percentage is shared with the salesman.

An equally significant form of bonus is that paid on net profits. All sales are not equally profitable. Competition whittles away the profits of some lines, and furthermore the margin of gross return, the percentage of selling and administrative overhead and the rate of turnover vary on different classes of products. A satisfactory method of compensation must not only stimulate volume, but the most profitable kind of volume, through sales showing the best net return. This is a need felt by the company which instituted a method of compensation, described as follows:

The salesmen are equipped with costs of all commodities as well as maximum and minimum selling prices; this range of selling prices being quoted so that they can talk intelligently with the customer who wants to purchase in very large quantities. The company pays the salesmen, first, a wage and expense allowance; and second, a bonus if they exceed the dead line between profits and losses on their sales. In putting salesmen on this profit-sharing arrangement and furnishing them with costs, the company found that the salesmen endeavored at all times to sell profitable merchandise. Also where they found a customer's order containing many low-profit items, the salesmen always tried to sell items of larger profit to absorb the shrink they would show on short profit ones.

If the concern finds the salesman's business does not show at the end of the month the desired percentage of profit, they discuss the matter with

him in an effort to bring his profits for the future to the desired basis. It is, however, seldom that the firm is compelled to take this step, as the salesmen know the profit they must aim for and it is nearly always accomplished.

Firms that have the interest of their salesmen uppermost in mind give a bonus for the greatest improvement in efficiency, which is determined by a consideration of all those factors that go to make up a valuable salesman, productiveness, i.e., the securing of profitable business; economy, as shown by expense accounts; industry, as shown by the number of calls; aggressiveness, illustrated by the number of new customers secured; trustworthiness, shown by an absence of complaints.

Bonuses are often used to develop the spirit of cooperation. Thus bonuses are given sales branches or departments upon attaining business in excess of quota, and are shared by the branch manager and the salesman. Again the sales contest is widely used to create the spirit of play in selling, to give vent in a healthy way to the element of rivalry and competition. Where organizations are large enough, branch is set off against branch, division against division. It is becoming a popular device to adopt much of the machinery of the baseball pennant race, with its teams, captains, scores, etc. In this way the contest relates itself closely to the life and imagination of the men. Mid-season results are frequently bulletined and distributed, and the interest maintained at fever heat. In contests of this sort, care should be taken to place men and branches, as far as is possible, on an even footing.

## V.—Analysis of the Task—The Point System

A leading authority on methods of compensation for salesmen stated, "That methods of compensation for salesmen require an appraisal of the job to be done. Find out what the job is worth and the concern is willing to spend to accomplish the job. Also find out what the operations are and how much the concern is willing to spend of the total sum or should be paid for each operation. Then take into consideration the individual, his cost to live, his expenses, his ability, his right to save and accumulate and the need of stimulation through incentives."

The desire to reach a fair basis of compensation leads invariably to an analysis of the job or task. The ultimate object of the salesman is obviously to sell goods, but there is much else he must do before and after receiving an order, for the salesman is the manufacturer's and distributor's representative in the field. He can do much to win back customers once alienated, and he must be ever alert for new customers. The salesman can report on the advertising activities of the dealers, whether they are advertising independently or whether they are using the firm's literature, and perhaps he can induce them to use the company's electrotypes or give window display to its products. All advertising material costs money and it pays to check up and intelligently guide its use by the dealer. Here the salesman can do much good work. Moreover, he can materially assist the credit department by informing it promptly of a turn for the better in a weak account, or a turn for the worse in what was a dependable account. He can make a local investigation of a new account and, by quick action, may be able to save the failing account.

The right kind of salesman will do a certain amount of prospecting and missionary work, making calls where he does not expect immediate orders and strives in every possible manner to widen the scope of distribution. He may even secure mailing lists from dealers. The alert salesman will report back to the production department alleged defects, strong points and suggested changes in the company's products, and he will overlook no opportunity to demonstrate the use of operation of his material.

To encourage all such beneficial activity on the part of salesmen, companies are definitely recognizing its worth by paying therefor exactly as they might for orders received, payment for service as well as sales involves finding some common denominator, and this is obtained by using the point system of compensation. The sale of the product requiring the least resistance usually furnishes the unit of measure and a point is given for every dollar of sales of such product. From this foundation a table of values is established for every kind of sale and service rendered. Additional points per dollar of sales will be granted for products offering increased net profits, for products especially hard to sell, for products that are being closed out. The salesman, too, will be credited for every kind of service he may render. He will be given points for turning in sales reports promptly, for calls made without sales, for assistance to the credit, advertising or production departments, for demonstration of product, and for securing particularly desirable new business.

Not only is the salesman given points for desirable performances, but he is penalized for those actions which do not reflect credit upon the house. Penalties are inflicted, for example, for misrepresentations of wares, excessive returns of merchandise, and the loss of customers. The salesman may even be held responsible in part for losses from bad debts.

A business concern cannot stand still. If not properly compensated, missionary work and prospecting will be slighted or not done at all. The point system of compensation for each kind of service rendered and sales made acts as a corrective and tends to restore a proper balance to the salesman's activities.

# LANGWORTHY SILICA COMPANY PRODUCES SILICA SAND IN IOWA

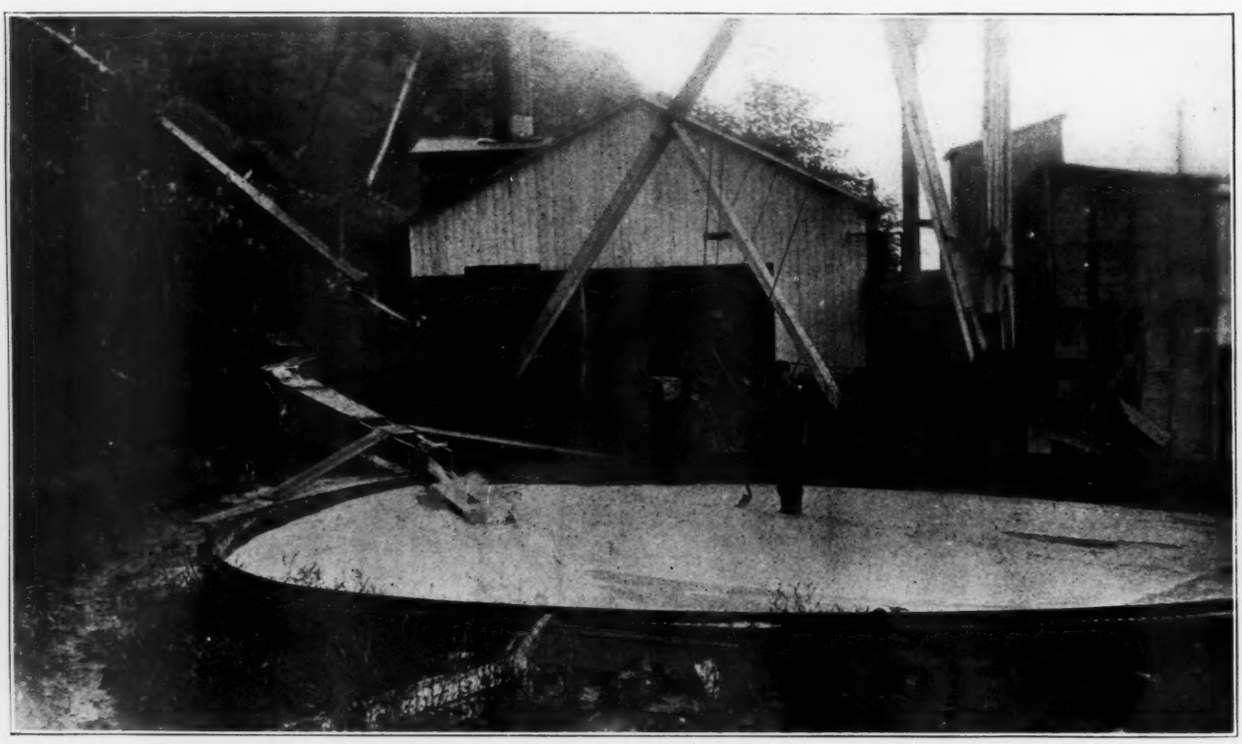
THE Langworthy Silica Company, 902 Federal Bank Building, Dubuque, Iowa, operates a plant for the recovery of silica sand, which is located 1¼ miles east of Clayton, Clayton County, Iowa. For adequate transportation, it has the Chicago, Milwaukee, St. Paul and Pacific Railroad and the Mississippi River. Water is pumped from the river for hydraulicking, washing and conveying the material.

A ledge about 80 feet high and approximately one-half mile in length, which consists of a consolidated sandstone, is being exploited. The overburden is composed of a mixture of clay and Galena limestone and varies in thickness from 2 to 40 feet.

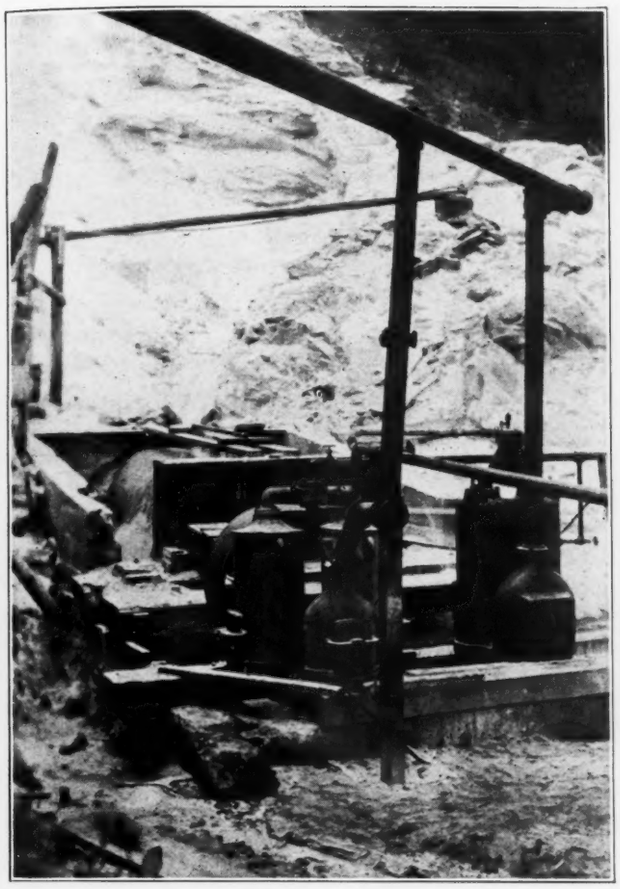
The overburden is stripped with a 1½-yard Sauerman power drag scraper, which is operated by an 8¼ by 10 double drum Stroudsburg hoist. After the overburden has been removed, the entire surface of the ledge is carefully washed to clean all the remaining clay or shale from the material to be recovered.

Holes are drilled to a depth of 14 feet with Ingersoll Rand jackhammer rock drills. The number of holes required for a blast varies according to conditions and the amount of material it is desired to loosen. Some blasts require as many as 30 holes, while other blasts need from 6 to 10 holes. About three-fourths of the material is blasted into

Ward Straitt, Superintendent Langworthy Plant



Storage Tank and Boiler Room



Screen and Vacuum Pumps

Cars, Loaded for Shipment

sand, and the lumps which are too large to move with water are broken by hand with a pole pick.

Washing, as well as conveying, is done with water which is pumped from the Mississippi River at 115 pounds pressure. The water, which is used for hydraulicking the material, is forced through a 1¼-inch nozzle, operated by one man. The sand is washed to a rotary screen, which has ⅝-inch perforations and all oversizes remain in the screen until they are made sufficiently fine to pass through the holes.

The material with the water flows by gravity from the screen into a sump. It is then pumped by two Number 4 Nye pulsometer vacuum pumps onto a V-shaped screen with ¼-inch perforations.

Pumping Water from Mississippi River to Pit

Hydraulicking the Material

From this screen the sand passes by gravity into the storage tank, which is of steel construction, 40 feet in diameter by 12 feet deep. As the tank is filled with sand, it is followed up with 4 by 4-inch blocks, and the water carrying all the refuse overflows. The sand is conveyed from the storage tank to the railroad cars by a 1½-yard Blaw Knox clamshell bucket, operated by an American clamshell derrick hoist.

Officials of the company are Otto F. Lange, president; John G. Chalmers, treasurer; Harvey M. Lange, secretary; and Ward Straitt, superintendent. The plant has a daily capacity in excess of 800 tons.

## Highways Improve Conditions in Haiti

The economic structure of Haiti is based solely on agriculture, and its new branches of farming support by far the greater part of the population. Of the 2,500,000 people living in Haiti, approximately 85 to 90 per cent are illiterate. By reason of the generally low standard of living and limited earning ability of the population there is comparatively little purchasing power.

Adverse factors have resulted in a very restricted development of natural resources, in narrow limitations as to produce occupations, in an abundance of unskilled labor and in few current means of creating and establishing wealth as a reserve force to agriculture. Reacting influences have also militated against the development of good roads, leaving the highway system inadequate and lacking in permanence. Railways in Haiti are very limited in extent, and the social and economic structure is strongly dependent upon communication by means of animals.

A more modern outlook has been steadily evolving, however, and lately there has been an expanding desire for more rapid and comfortable means of transportation which recently has been finding expression in the increasing use of motor vehicles. This, in turn, has a tendency to react favorably on the development of the country. Capital is being directed toward productive enterprises, which are employing labor on a larger scale. The modernizing tendency in connection with transportation is stimulating the desire to obtain ready funds; and the large monetary returns received from agricultural products during the last six months is giving an impetus to the movement in favor of motor vehicles.

## Plaster of Paris Manufacture

The use of mechanical kilns makes possible the control of the firing of the plaster. But this control, while important enough, is not in itself sufficient, as there are factors other than the temperature which exert an influence upon properties of the plaster. It is especially indispensable to submit the plaster to appropriate tests if it is desired to improve the plaster or merely to assure uniform production. The regularity and uniformity of the setting and hardening are properties essential to a good grade of product and most of the difficulties encountered in its use in construction are due to the irregular course of the setting and hardening. Such irregularities occasion not only loss of plaster and valuable time, but also often necessitate the rebuilding of the work. The establishment of a control laboratory is thus seen to be a necessity if uniform product is to be obtained. It must be remembered, however, that the great difficulty will be the adoption of proper tests for the product. France has no official tests for plaster of Paris, and, where this is true of other countries, tests must be devised by the plant itself, a standard established, and each shipment must be tested by the works test before leaving the plant.—L. Chassevent (Le Ciment, July 1928).

# KEEPING TRACK OF DWINDLING ACCOUNTS

By J. J. Berliner

SUPPOSE an x-ray examination could be made of the books of every concern in the country, wouldn't it be a matter of surprise to most proprietors and business executives to find a large number of accounts which were either stationary or declining in the amount of business done, and yet that is one of the most important items in any business. Getting customers is one thing; keeping them is another. A lot of money is spent constantly for the purpose of getting more business. Then why not keep track of the customers. Is a customer buying less, what's the reason. If the account is stationary, there's a reason. If there is no knowledge of these facts, there is no way of remedying this defect.

A simple system can easily keep track of accounts and show just what accounts are stationary or declining and by keeping these simple records, business will be increased. The following system was installed by an accounting concern and operates in this manner:

The monthly totals book gives in a tabloid form the most vital statistics of the selling end. The book itself should be well bound and should contain from 200 to 250 pages, with an alphabetical index for reference; it should be made upon the loose-leaf ledger plan, as being the most elastic method for expansion; the pages should measure about eight inches in depth by about eleven inches across. However, size of pages can be decided by individual need. Some idea of the book is given by the illustrations, which show details of the design and allocation of one of the pages. Figure 1 shows the arrangement of one page.

Arranging the book to meet all requirements—The first column is for the folio; and at the very top of the page appears the name of the company, followed by the name and address of the customer. Space is reserved on the left-hand side, directly under the customer's name, for the ledger account number of his ordinary ledger account; on the right, a similar space is left for details of the terms of the account, i.e., percentage of discount allowed, and the period of the terms of payment. The space in the middle can be used for the customer's telephone number and telegraphic address. The remainder of the page is then divided into halves, each of which is again divided into four equal spaces at the top and bottom, thus making eight spaces per page.The idea is to make each page

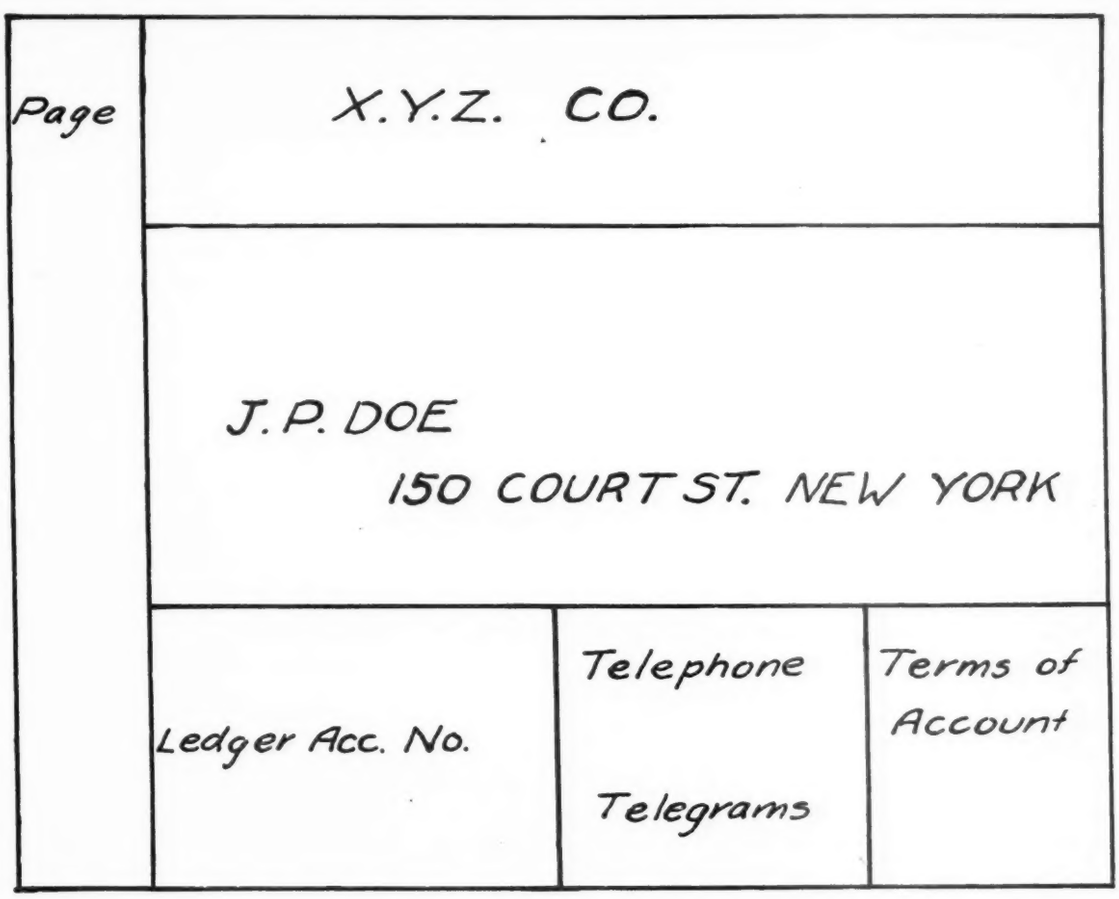



Fig. 1 Heading of a Sample Page of Monthly Totals Book

cover as wide a period of time as possible. As shown each space is sufficient to cover a period of six months, so each page when quite filled, shows the totals for four years.

A glance at Figure 2 will show that the first column is the year to which the adjoining columns refer. Next follows a monthly column, a money total and percentage column; a ruling at the bottom provides a monthly total, followed at the extreme foot of the page by another ruling for a yearly total.

The original carrying out of this idea did not contain all these details. They are the improvements suggested by use, and a word of explanation as to the apparent elaboration of detail is perhaps necessary.

The monthly totals book should contain all the necessary information. If the fullest use is to be made of the system, it is advisable to fill in the number of the account, terms of business, and telephone and telegraphic addresses, because should the chief user of the book wish to consult the ledger, he has only to refer to the number of the account. The same applies to the terms of business —no reference is required elsewhere—and so delay is avoided. Should it be necessary to telephone or telegraph a customer, the book can be used as an index for instant reference, hence the idea of making each page as complete in detail as possible.

The method of operation of the monthly totals book is simplicity itself. When starting the book, it is essential to make one person responsible for it, such as the ledger clerk.

The totals show at a glance how matters stand with each account. Before form 2 is started, two things suggest themselves. First, is it advisable to commence the book with the current year, or would it be wiser to start with one or two years back? Each business must decide this question for itself, but in a majority of cases, it is a good plan to enter it up for at least the year previous to the inauguration of the system. The next step is to get the book entered up to date, and see that this is regularly done month by month.

The ledger totals should be entered in the monthly columns in black ink. Then the six months' totals are added up, and the result written down in green or other colored ink, and the two half-yearly totals, added together, should appear in red ink. The same method should be adopted in dealing with the percentage columns, and in order to call attention to an increase or decrease in turnover, the letters "D" or "I" as the case may be, should be placed beside the percentage figures. It is advisable to carry this out with the half-yearly and yearly totals, in order to show the comparison between one period and another.

The value of a completed list of periodic totals covering say four or five years, cannot be overestimated. A firm adopting the idea possesses at once the key to the inevitable fluctuations of every business account on the firm's books, and thus becomes increasingly valuable as a correspondingly greater length of time is covered by the statistics thus provided. A close and constant perusal of the

| Year | Month | Total | % | Year | Month | Total | % | Year | Month | Total | % | Year | Month | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| 6 Mo's. | Total | | | 6 Mo's. | Total | | | 6 Mo's. | Total | | | 6 Mo's. | Total | | |
| | | | | | | | | | | | | | | | |
| 6 Mo's. | Total | | | 6 Mo's. | Total | | | 6 Mo's. | Total | | | 6 Mo's. | Total | | |
| Year's | Total | | | Year's | Total | | | Year's | Total | | | Year's | Total | | |

Fig. 2 Detailed Working of the Monthly Totals Book.

accounts shown in the book will undoubtedly raise a considerable number of queries in the mind of the executive. Thus careful inspection of what were once large or promising accounts, but which lately have shown a tendency to dwindle away, enables the busy executive to give greater attention to these essential factors in the prosperity of the concern and enables him where it is possible to check a decline or to try to secure a larger share of business. This is where the percentage columns prove their value, for at a glance the upward or downward tendency of any account is made apparent.

At the end of every half year a careful examination of each account is made by one concern and where a customer did not seem to be ordering the full amount of goods his business warranted, a diplomatic note was sent out under the signatures of one of the executives, suggesting that a larger share of business would be mutually beneficial, and emphasizing any particular points in regard to quality of material, prices, and so on. If there happened to be any difficulties or complaints, real or imaginary, in the mind of the customer, one of the executives offered to see him personally to talk things over with him and smooth away any difficulties or unfriendly feeling that might exist. The fact was, that a strong personal touch was introduced into the dealings of the firm in question, which, together with a wise and systematic policy of keeping as careful an eye upon the selling as upon any other end of the business, ensured success.

## Road Builders to Meet in Mexico

Elaborate plans are being completed for the opening of the second National Road Congress of Mexico, to be held October 3 to 6, according to Charles M. Upham, secretary-director of the American Road Builders' Association, who is in Mexico arranging for the event. President Calles will formally open this Congress of road engineers and officials of approximately twenty nations. The American Road Builders' Association, through its Pan-American Division, has accepted an invitation to participate in the Road Congress and will invite engineers and officials from all sections of the United States to be present.

Greatly reduced railroad fares have been obtained for all American officials and engineers who desire to go to Mexico for the Road Congress. The delegates will be given an opportunity to inspect the methods of road construction and maintenance there. Senor Octavio Dubois, president of the Mexican National Highway Commission, is also president of the Pan-American Division of the American Road Builders' Association, which is cooperating in staging the Road Congress.

## Simplification of Commercial Forms Being Determined By Survey

A survey among members of the National Association of Purchasing Agents has been instituted by Ray M. Hudson, Assistant Director in charge of the Commercial Standard Group of the Bureau of Standards, United States Department of Commerce, the purpose being to determine the degree of adherence to simplification of commercial forms and what percent of invoice forms now in use conform with the simplified arrangement. Adherence to these forms is becoming more prevalent and, according to Mr. Hudson, the Federal Government is adhering strictly to the standard contract form for construction and the one for supplying materials, both of which were promulgated on November 1, 1926. These forms are used without deviation by all Government activities and in addition a standard Government form of contract for coal has been completed.

Recently, representatives of 21 nations, members of the Pan-American Commission on the Simplification and Standardization of consular procedure, gathered in Washington to work out a plan on this subject for the American republics. Not only governments but many concerns, individuals, and railroads have applied simplification methods with great success both in savings effected and reduction of confusion due to a multiplicity of forms. Mr. Hudson, in summing up the results, says that countless duplications have been eliminated and many unnecessary manufacturing operations avoided. The Division of Simplified Practice expects to release a monthly tabulation of returns from the survey being made.

## Citrate of Lime Production in Italy

Production of citrate of lime and concentrated lemon juice in Sicily and Calabria, Italy, from December 1, 1927 to June 10, 1928, is estimated at 4,919 metric tons as compared with 5,200 tons during the same period last year. The summer lemon crop is poor, so that the year's production may be 5 to 10 per cent smaller than during 1927.

The "Camera Agrumaria" has guaranteed a large reserve of calcium citrate (10,259 metric tons on December 1, 1927) as security against an outstanding indebtedness of 27,000,000 lire ($1,350,000) and has been subjected to new rules for operation. A recent ministerial decree provides that a detailed plan of cancellation must be drawn up for the approval of the Ministry of National Economy, under which the debt must be extinguished by November 30, 1928; seven-tenths of the balance of calcium citrate on hand on December 1, 1927, may be disposed of under this decree.

# NEW CEMENT BURNING PROCESS

By Dr. Karl Biehl

THE use of shaft kilns for burning cements has been surrounded with great disadvantages up to the present time, a fact which no one can deny, and which has been a proper basis for the prejudice that exists within wide circles against this type of kiln for use in the cement industry. It, therefore, follows that if this type of kiln is to compete with the other types of apparatus used for similar purpose in this industry, it would be necessary to revolutionize the construction of the kiln in order that the production of cement from it, both from the standpoint of quality as well as quantity, might be able to meet present requirements.

A new type of shaft furnace has recently been introduced into the German cement industry, known as the Andreas kiln. All the aforementioned demands are fulfilled by this new burning process and the new kiln, and all the difficulties and faults which originally characterized the cement shaft kiln have been removed, as is claimed. The new process was invented some years ago by Andreas and the inventor has spent the intervening time in perfecting his machine and process, improving it and simplifying it. The result is that he has now an apparatus and process, as is claimed, that is available to the Portland cement industry and that may be called a high production shaft kiln.

No material remains hanging on the sides of the kiln and the cement is always well burnt. The capacity of the kiln has been increased by one hundred per cent over the former shaft kilns. In addition thereto there has been an astonishing increase in the quality of the clinkers, while the consumption of power and of fuel remains normal. These are in a nutshell the principal advantages of the new burning process and the apparatus in which it is carried out.

The caking of the clinker in the shaft kiln and its adherence to the vertical walls was the main difficulty encountered in the operation of the common type of shaft kiln. These disadvantages were, moreover, also accompanied by high consumption of fuel, low production, irregular quality of clinker; and they all had such a potent effect on the operation of this apparatus that it was hardly rational to consider its use in the manufacture of cement.

One of the most important points in the operation of the shaft kiln is the formation of caked masses of clinker which adhere to the walls of the kiln. Much has appeared in the trade literature on the probable causes of this phenomenon. The lining of the kiln, the fuel, the irregularity of the raw cement mixture, the use of cement mixtures containing much flux (iron and alkali) and the carelessly conducted burning process have all been called the principal causes of this phenomenon. The inventor of the new kiln based his ideas on the fact that most of these causes could be overcome by simple means and hence he spent most of his time in studying and experimenting with the burning process itself. He felt that it was of the greatest importance to be able to keep the process always in hand and this he tried to attain by suitable kiln construction.

In the ordinary type of shaft kiln, the blast of air passes up along the sides of the kiln for the most part, that is along the lining, for the air will always seek the path of least resistance. Furthermore, the air blast tends to pass through the holes in the kiln charge. Certain disadvantageous conditions are entailed thereby. In the first place when the air is not carried into those parts of the kiln charge where it can be used, it does not come into contact with all particles of combustibles. Furthermore, fine pointed flames are formed around the edges of the charge, that is, in immediate contact with the walls of the kiln, due to the great excess of air at these places. The high temperature of these flames results in the lining of the kiln softening; furthermore, the clinker is also adversely affected. The result is that it cakes.

These difficulties are avoided in the new type of Andreas shaft kiln. Air is introduced at those places where it is used in the combustion process. The result is, as corroborated by practice, a much more uniform fire than heretofore, reduced consumption of coal, acceleration of the burning process, which is just as rapid as the burning process in the rotary kiln, rapid cooling of the clinker and avoidance of hanging masses of caked clinker on the walls of the kiln.

All sorts of materials can be burned in the Andreas kiln. Materials which produce disturbances in operation of the rotary kiln due to the formation of adhering masses to the kiln walls (caused by the high proportion of flux in them) can be processed without any difficulty at all in the new shaft kiln, no adhering clinker forming on the walls of the kiln during its continuous operation. In this particular case, the shaft kiln possesses a certain advantage over the rotary kiln.

It has been known of old that rapid and intense burning and rapid cooling give high grade cements. This operating rule is also corroborated in the new type of shaft kiln. The very rapid burning process as well as the rapid sintering process which take place in the high production shaft kiln have an extraordinarily favorable effect on the quality of the clinker and of the cement that is made from it.

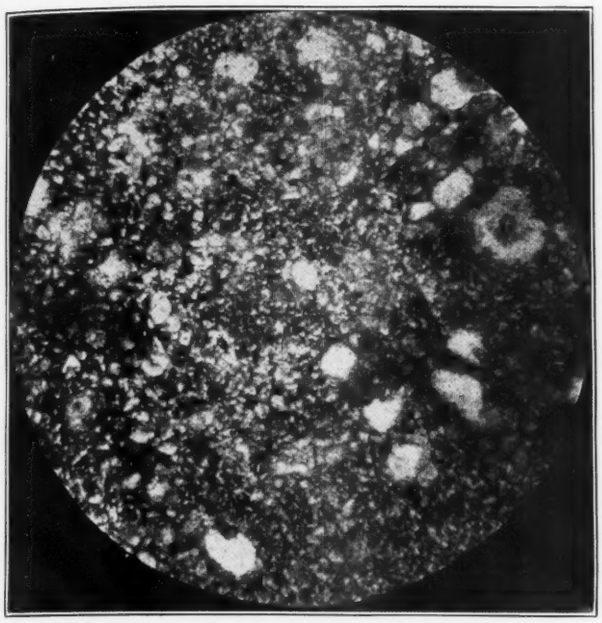


Figure 1

Due to the irregular distribution of the air blast in the old types of shaft kilns, it was not possible to obtain safe and effective cooling of the clinker in these apparatus. When the kiln was forced, incandescent clinker was found on the grate and also on the transporting apparatus, and disturbances in the operation of the apparatus were therefore frequent. This unfavorable condition is not found in the Andreas shaft kiln.

In order to increase the output of the kiln, it was customary heretofore to increase the height of the kiln quite considerably, until it was as much as sixty feet high above the grate. It is not necessary here to relate the structural and other difficulties that were entailed by this practice nor to mention the increase in the cost of such an installation.

In the new type of shaft kiln, the height of the shaft above the grate is at a maximum from eighteen to thirty feet. Increased output of clinker is secured in other safer ways.

The main feature of the operation of the kiln is the uniform distribution of the blast, for this has not only a favorable effect on the burning of the cement, but it brings about more rapid and more intensive cooling. The clinker leaves the Andreas shaft kiln at a much lower temperature than in earlier types of the shaft kiln.

It has been found that kilns with an internal diameter of 7.5 feet and a height of shaft above the grate of only 22.5 feet to 24 feet, which produced 44 to 55 tons of clinker before the kiln was reconstructed, produced as much as 110 tons of clinker after the structural changes were made. No difficulties were encountered in the operation, which may be said to be due to too hot clinker.

It is the inventor's contention that in the future the normal height of the shaft kiln will probably be from twenty-four to thirty feet, even when the output of the kiln is very high. It is, therefore, his hope that he can build shaft kilns for use in the cement industry of even lesser height.

Furthermore, the material does not form large lumps during the burning process. It is actually a fact that the rapid and intense cooling of the clinker results in the disruption of the masses and the formation of a granulated product. The rapid and intense cooling of the clinker has a very favorable effect on the quality of the product. This is corroborated by experience.

The new shaft kiln does not operate with excessively high air pressures and does not entail thereby great consumption of fuel. The fuel consumption in this process has remained the same as in the other processes used up to the present.

The new burning process was used at the beginning only for material in the form of brick or briquettes. However, experiments carried out in a certain cement mill, which did not have a supply of plastic material available for conversion of the cement mixture into briquettes which would not fall apart, led to the conclusion that the use of material in the non-briquetted form in this kiln does not give rise to any operating difficulties and the intensity of the burning process was still maintained even under these conditions. Hence it was seen fit to recommend that presses should not be provided for making the briquettes but that a mixing screw of special construction is merely necessary in order to moisten the raw cement mixture and carry it to the kiln. Thus the new type of apparatus has solved the problem of burning cement in the loose form in shaft kilns.

A disadvantage in burning non-briquetted masses, particularly when using materials which are not particularly plastic, is that a larger amount of water must be used in this case than is customary. This is, however, only an incidental matter. Certain solutions may, however, be employed whereby a material which is not sufficiently plastic may be used with only a small amount of added water. It is still, however, a mooted question as to whether or not the use of a larger amount of water in the cement mixture is actually a disadvantageous condition.

For it has been found that as far as the consumption of coal is concerned, the presence of a somewhat greater proportion of water in the cement mixture has a favorable effect. Thus quite a number of cement engineers and technologists have subscribed to the opinion that the somewhat higher proportion of water in the raw cement mixture renders possible more intense burning of the clinker and particularly the production of a clinker which is much easier to grind. The explanation of this phenomenon is as follows: Dry material is a very bad heat conductor, while on the other

hand the strongly moistened material conducts heat better and hence has a favorable influence on the burning process.

The evaporation of the water in the raw cement mixture makes the mass more porous, and due to this condition the combustion air comes into more intimate contact with the fuel. The produced clinker is likewise porous and well burnt. This has a favorable effect both on the ease with which the clinker is ground and also on the quality of the finished cement.

The phenomenon has often been observed that the rotary kiln clinker that is produced in the wet cement making process can be more easily ground than the clinker that is produced by the dry process. The conditions are very similar here as in the process that has been described above. Furthermore, the fact has not yet been established without a chance of contradiction that the fuel which is mixed with the raw cement materials and formed with them into briquettes is completely burnt. The experiments, which have been carried out on this problem, have indicated that the fuel in the briquettes is not completely burnt even when a large excess of air is employed and that unburnt particles of fuel are always found in the clinker. This fact has been evident to the practical cement man and he has taken steps to overcome it. Thus many cement mills that work their raw cement mixtures into briquettes with fuel use only a small portion of the required fuel in this manner and use the rest by atomization.

An entirely different idea has been suggested in contradistinction to the above, namely that liberated carbon dioxide, due to the dissociation of the calcium carbonate, that is during its splitting into lime and carbon dioxide, is decomposed in accordance with the following formula: $CO_2 + C = 2CO$.

This means that it is believed that carbon monoxide is formed by a reaction that takes place between carbon and the carbon dioxide which is evolved from the limestone. The heating value of carbon monoxide is knowingly high. Thus the coal or carbonaceous fuel that is added to the apparatus is usefully consumed in combustion with the aid of the carbon dioxide that is liberated from the limestone.

The experiments which have been made on this problem have not been altogether conclusive and hence it cannot be held that such a process, as described above, actually takes place. If it does not take place, then it is evident that it is wholly inadvisable to press all of the fuel together with the cement mixture into briquettes and to feed these to the shaft kiln. It would be far better to operate the kiln under these conditions with many individual flames, that is with a rain of flame.

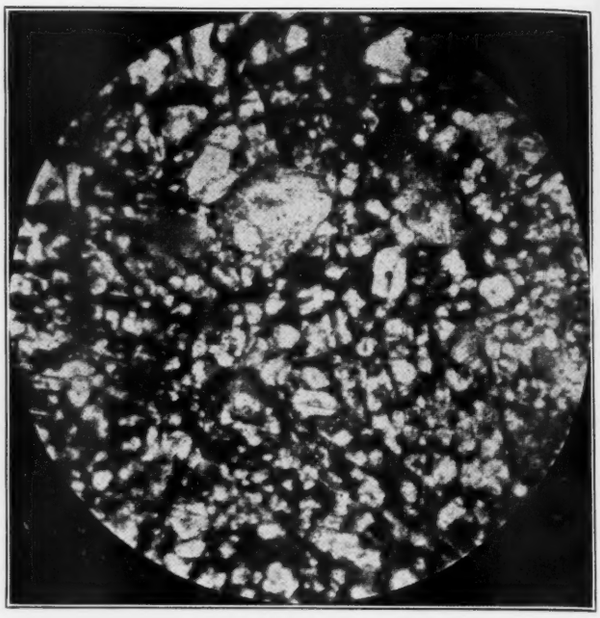


Figure 2

However that may be, whatever theory is correct, practical experience has shown that it is far better to operate the Andreas shaft kiln with non-briquetted cement mixture. For the loose and finely pulverized condition of the fuel in such practice has a far better chance of coming into contact with the oxygen of the air blast and being burnt completely to carbon dioxide and also of reacting with carbon dioxide that is evolved from the limestone than if the fuel and the limestone, as well as the cement rock, were pressed together into a dense briquette.

The inventor is careful to state that the new form of shaft kiln is not intended to supplant the rotary kiln. The conditions are such that both the rotary kiln and the shaft kiln can exist very well one alongside the other, so to speak, and both can develop and become more extensively used, enjoying a healthy competition with one another. The impulse which has been given the cement industry by the development of the new type of shaft kiln will unquestionably be of great value and will help the further development of the rotary kiln, which must not be considered as having as yet reached the highest point in its development.

The illustrations which accompany this article are a number of microphotographs of thin slices of clinker which has been burnt in the Andreas shaft kiln and also of clinker which has been burnt in the older type of shaft kiln. Thus it is easy to tell the difference between the two kinds of clinker from the petrographic structural standpoint. It is also seen that the clinker which is burnt in the Andreas kiln is almost identical in structure with that which is obtained in the rotary kiln. These various samples of clinker were obtained in practical operation from the same type of raw material.

Figure 1 shows a microphotograph of a thin slice

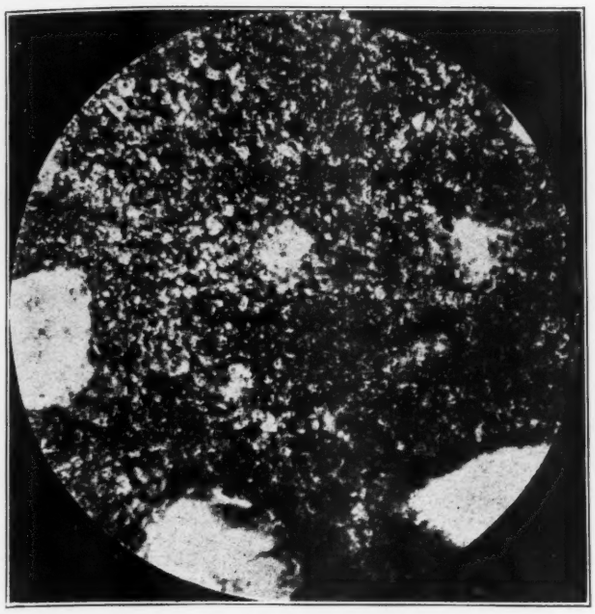


Figure 3

of clinker made in the rotary oven. The extraordinarily finely grained and dense structure and the comparatively strong formation of glass (larger white specks) are typical for this type of clinker. The finely crystalline dense structure and the formation of glass are signs of the fact that the raw cement mixture has been intensely burnt in the kiln and has been rapidly cooled thereafter.

Figure 2 is a microphotograph of a thin slice of a clinker which is obtained from the ordinary type of shaft kiln. The large crystals are very characteristic of this sort of clinker as well as the almost complete absence of glass formations. The large crystals and the absence of glass formations indicate that the clinker has been well burnt, but has been very slowly cooled thereafter. It is quite a well-known fact that rapidly cooled clinker gives a cement with much more favorable strength characteristics than a clinker which is slowly cooled.

The finely granulated structure and the presence of certain quantities of glass in the clinker exert a great influence on the attainment of high strength characteristics in the cement made from it.

Figure 3 shows a clinker which has been burnt in the high output shaft kiln according to the Andreas process, the raw material being used in the non-briquetted condition. The difference between figures 2 and 3 are therefore very clear. Thus an extraordinarily finely grained and dense structure and a large amount of glass formations are observed in figure 1, which are so characteristic of the clinker that is produced in the rotary kiln. Nevertheless, the microphotograph of the clinker obtained in the Andreas kiln shows that the structure of this clinker is very much like that of the rotary kiln clinker.

## Short Course in Concrete Featured at Penn U.

Faculty and staff members of engineering colleges and laboratories throughout the country will attend a course in design and control of concrete mixtures at the University of Pennsylvania, Philadelphia, September 18 to 21, according to announcement by the Portland Cement Association. Two previous courses, held in 1926 and 1927 were attended by representatives of 27 leading engineering schools. Men attending are specialists in concrete testing and supervision and will consider latest methods of concrete control now being successfully applied in practically all construction work. The interest of construction men is evidenced by the attendance of 31,800 engineers, architects, contractors and others at 192 similar evening short courses, held during the period 1925 to 1928.

The course at Philadelphia will consist of two sessions of three hours daily. Members of the Association staff and specialists engaged in concrete construction or research work will give the lectures and demonstrations. Included on the program are, H. C. Berry, professor of materials of construction, University of Pennsylvania; William H. Gravell, consulting engineer of Philadelphia; V. L. Johnson, architect, Philadelphia; J. A. Turner of the Turner Construction Company, Philadelphia; H. F. Gonnerman, manager of the Research Laboratory and J. W. Kelly, R. S. Phillips, L. H. Doane and L. E. Andrews, engineers of the Portland Cement Association.

An outline for an undergraduate course in designing and testing concrete, based on suggestions made by instructors in concrete from many prominent engineering schools, will be presented. Extension courses and an outline for an evening laboratory course, conducted by college instructors for inspectors, contractors, superintendents, foremen and others especially interested, will be discussed.

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## Lime Production Increases in Germany

The German Lime Producers Association reports that the 1927 lime production was a record for postwar years, having reached 4,650,000 tons as compared with 3,680,000 tons in 1926. Notwithstanding an increase of 26.5 per cent in the production, the number of plants decreased from 190 to 180. Of the 4,670,000 tons of lime shipped in 1927 the building trade took 37.6 per cent of the total shipments, the iron and steel industry 27 per cent, agriculture 13.2 per cent, the calcium cyanamide industry 7.8 per cent, the chemical industry 4.9 per cent and the plants producing bricks from lime and sand 4.9 per cent.

# A SYSTEM OF NATIONAL HIGHWAYS

**By Charles Davis**

FRANCE, Germany and Italy own, build, and maintain their national highways. These highways were a controlling factor in the World War. America excels in a marked degree all the rest of the world in motor-vehicle transportation. But America leads in her highways only on an area less than 5 per cent of her territory.

The mileage of our public roads is adequate for our present needs—some 3,000,000 miles—and this mileage will grow automatically to take care of future needs. Of these, over 2,400,000 miles are native soil, soft, dirt roads which mostly become mud in wet weather and are then impassable. As a system, they are lamentably lacking in proper location, alignment, curves, width, grades, drainage, hard surfacing, paving, and other requisites of properly improved highways, and especially lacking in continuity over any extended mileage.

Only a paved road can be a permanent one. About 3 per cent of this 3 million miles is paved; that is, surfaced with bituminous macadam, sheet asphalt, bituminous concrete, Portland cement concrete, brick, stone block, wood block, asphalt block and miscellaneous other types. A little over 1 per cent more have top surfaces of various kinds and are known as "hard-surfaced" roads. We thus have a total of about 4 per cent of hard roads, or less than 130,000 miles. Only a hard road is a good road three hundred and sixty-five days in the year. If a map of this hard-road mileage were made for the United States as a whole, it would look like that of Michigan issued in 1913 under state aid.

Practically none of our present mileage (including bridges) has been built suitable for military needs, either in type, weight, width, alignment, curves, grades, continuity, or the avoidance of congested centers.

Twenty-five years ago, there were no hard roads. In 1915, we spent something over $250,000,000 in trying to improve our highways. This probably means over $3,000,000,000 during the fifteen years, 1903-1917. In 1925, we spent on improvement over $1,200,000,000 which likely indicates more than $9,000,000,000 during the ten years 1918-1927—a total of over 12 billion dollars endeavoring to improve our roads in the past twenty-five years. No one can say accurately the exact amount, but this is near enough for practical purposes. This vast expenditure has given us in round numbers:

About 90,000 miles of paved highways.

About 40,000 miles of hard-surfaced roads.

About 470,000 miles of surfaced roads.

More than 2,400,000 miles of native soil, soft, dirt roads.

No one knows how much we have spent in these twenty-five years on these native soil, soft, dirt roads—grading, ditching, scraping, dragging over and over, again and again. Our road bill of fifteen, maybe twenty, billion dollars, more or less, in twenty-five years, has given us the above results. We should and could have done better.

Many of our paved roads are being rebuilt—more will have to be. All our hard-surfaced roads will be paved. Our surfaced mileage, made of water-bound macadam, stone, gravel, chert, slate, sand clay and oil sand, will all be hard-surfaced and then paved, unless paved first. All additional surfaced mileage eventually will be rebuilt in similar manner if we go along as we have in the past.

But our improved roads are a disconnected, disjointed aggregate of mileage. We have very few long, continuous, through roads, paved from end to end. Our present paved highways are again best pictured by the map of Michigan under state aid. For the same cost and in the same time, we could have had 400,000 miles of continuous, connected, paved highways, north and south, and east and west, through every one of our three thousand and seventy-two counties in our forty-eight states. Why not have them in the next twenty-five years?

During these twenty-five years we have had one hundred and sixty million motor vehicles on our highways. They probably average more than 5,000 miles a year, so these vehicles have traveled over 800 billion miles. Tests show that paved roads save over 2.5 cents a mile in operating costs. Adding the probable repair and depreciation saving, the total is likely over 3 cents a mile. As during these years we have had a negligible paved mileage, except in our cities, our loss is likely to have exceeded our expenditures for building during these twenty-five years. This is enough to have built another 400,000 miles of continuous, paved highways. Our road bill in cost plus loss for twenty-five years thus amounts to 30 billion dollars at the least, and more likely 40 billions, and we have less than 100,000 miles of paved highways—the only kind that can be permanent.

During these twenty-five years, our people have become more and more alive to the need of good roads everywhere. They have come to know the fundamental necessity for these good roads. They understand that economic, material, and social progress depend largely upon having good roads. They realize that their well-being and prosperity are most favorably affected by good roads. This awakening to the vast benefits and need of good roads everywhere has taken a grip on the entire nation. We see this in the many road associations working for the cause or for a particular highway. We see it in the ever-increasing road appropria-

tions by towns and townships, by counties, by states, and now by the federal government. On the other hand, the tardiness with which actual good roads materialize leads us to the inevitable conclusion that we can vastly improve in our methods of attacking this great work. Why has this vast amount of money failed to give us the good roads it could have built? The answer is found in the history of our road building.

To demonstrate, let us give a brief outline of the evolution of road building in the United States.

Dirt Roads—The country dirt road was, of course, the beginning. In some localities this was gravel, with no machinery in those days other than the pick, shovel, wheelbarrow, and cart. Later, came the road machine (scraper) and drag. They did not add much to road building. They, however, made it easier to make the roads again passable after wet weather and generally to maintain them. We still have some 2,400,000 miles of these roads mostly impassable in wet weather.

Gravel Roads—Later came our gravel roads. Where built, they became the "good roads" of the period.

Macadam, Telford, Stone—These were the "turnpike" days, when roads were privately built and maintained by exacting tolls from the traveling public. In turn, these stone roads became the "good roads" where they were good, which was seldom. They were mostly built and maintained by spreading broken stone for the passing vehicles to roll over and grind into place. Later, they were better built and heavily rolled, and were our first roads that had a semblance of being good for a short time. They broke down with the arrival of the automobile and the truck.

Hard Roads—Our more than 23 million motor vehicles of today make hard and paved roads the only possibly good roads of the future. We have only been building them a few years. Relatively, we have a very limited mileage—less than 130,000 miles out of about 3,000,000 miles.

To practically everyone, a good road is the best road as yet seen by that particular individual—whether it be dirt, sand clay, gravel, macadam (stone), or some type of hard or paved road. In most communities, money has been raised to build only the kind of good road they have seen, used, and know about. To get a given community to build better roads, which always cost more, it has usually been necessary for the next larger political unit to supply the money and build the road. Its use induces the building of similar good roads by the smaller political unit. It is by such example that our good-road mileage has been extended through the building of state highways, and can be extended throughout our forty-eight states by the federal government in building the system of 100,000 miles of United States highways. From every mile of these United States highways will spring up ten more miles of state, county, and township or town road.

At first, road building was largely confined to the efforts of the local communities—the cities, townships, and towns or counties. As might be expected, some of these communities spent their money judiciously—built good roads (such as they then were) and maintained them fairly well. Others, and they were in the large majority, did neither. Those which did found that business gravitated toward them. This traffic from adjoining communities destroyed the roads but did not help to pay for them.

Thus, trouble arose between the places having good roads and the adjacent communities. As a result, demand was made that those outside communities which shared the advantages should help bear the expense of the roads. So the larger unit, the county or state, was asked to help solve the difficulty. It was also true that the sparsely settled localities could not of themselves afford to build the needed roads. They had to have financial help from the next larger political unit, county or state.

The first effort of the county took the form of county aid. That is, the county appropriated money which was given to the various towns or townships to be spent by them. But this aid was spent by the same people in the same manner as before. Those townships which had heretofore built fairly good roads continued to build them. The others did no better than they had before.

As a result of this failure to get the needed roads, the counties took over control of the main county routes and built and maintained county highways. This was a step in the right direction. But later developments necessitated still further steps. The same difficulties which had come up between the towns and townships now developed between the counties, but on a larger scale.

So history repeated itself, and the state was called upon to settle the inter-county difficulty. This demand was most insistent from the rural counties which could not furnish the needed money even though they so desired. Again history repeated itself, with the state giving aid to the counties. But this aid was found to be inadequate, as had been county aid before. Consequently, our states are now building state highways, owned, built, maintained, and controlled by the state government, under the direction of a state highway commission.

A comprehensive system of highways can be established by the state, which is utterly impossible of accomplishment by the individual counties, each working independently of the other and for itself, no matter how excellent their individual efforts may be. Larger and more constant appropriations can be obtained from the larger unit. Bonds can be issued at a lower rate of interest.

Thus, better roads which necessarily cost more are built. Uniformity of construction and maintenance may be secured. Growth and improvement in town or township and county road building are not the least of these advantages, resulting in many more miles built by both. And, probably most important of all, the cost is fairly distributed. The bulk of this cost is placed upon the large rich centers of population. They can easily bear it because they profit the most.

And again history repeated itself between the states as it had before between townships and between counties, and for the same reasons. So federal aid came on July 11, 1916, amended February 28, 1919, resulting later in the Federal Highway Act, of November 9, 1921, amended June, 1922.

By these acts, we have aid from the federal government to the states. By this aid, we are getting roads built throughout the nation piecemeal, so that a map of the United States would look like the map of Michigan under state aid and not like the map of Michigan showing the results which have been gained by the building of its own state highways system.

Our states with state highways would not today permit their counties to dictate the terms and conditions under which state highways should be built. These states would scout the idea of leaving to their counties the building of state highways passing through the counties. The nation cannot permit the states to dictate the terms and conditions upon which our United States highways shall be built. The nation cannot permit the states to build them piecemeal. The nation must do the work, pay for it, and afterwards maintain our great system of United States highways. Roads which will cover the country with a network of primary interstate highways which will thus, at one cost, become the main trunk roads for the communities through which they pass—the towns and townships, the counties, the states and thus the nation. Only the nation can build these roads heavy enough, wide enough, straight enough for our national industrial and military needs.

These three systems of highways—United States, state, and local (county, township and town)—should be built around a fourth and greater system of national highways—50,000 miles—industrial and military highways, to carry the fast, the heavy, and the through traffic. This traffic would be fed to them over the system of United States highways, which, in turn, would collect it from the state highway systems, with which the local roads would connect. Such a system is visualized by the map entitled "National Highways." Such a system of national highways would redound to, and be commensurate with, the greatness of our country.

By this fourfold system of highways there would be an impetus as yet unthought of given to road building. Authority and responsibility would be logically and economically divided and fixed without conflict. Uniformity and efficiency would be established. Standards of construction and maintenance would be raised. The nation would be given good roads by a well-balanced, connected system of national, state, and local roads reaching out to the most remote parts thereof. They would be built in a short time, and with economy. The money would all go into roads, and the cost would be equitably distributed upon those communities best able to pay for them.

## Program for Canadian Road Show

The fifteenth annual convention of the Canadian Good Roads Association will be held in Regina, Saskatchewan, September 25 to 27, 1928. A comprehensive program has been arranged, covering all aspects of highway construction, maintenance, and use, including financing, taxation, types of pavement, materials, repair methods, sectional problems, and motor and traffic regulations. These subjects will be discussed by the delegates and it is hoped that profitable exchange of information will result.

The policy of the association has been to emphasize the advantage of holding these annual conventions in the more remote provinces of the Dominion. Of the nine provinces, only Prince Edward Island has not acted as host. Arrangements are in charge of George A. MacNamee, secretary-treasurer, Canadian Good Roads Association, New Birks Building, Montreal, Quebec.

## National Bank Power Greatest

National bank power in this country is now the greatest ever recorded, study of the latest announcement of the Comptroller of the Currency reveals. Resources of the national bank system are found to be $1,926,296,000 larger than a year ago, an increase of seven per cent. In eight years they have gained $9,387,939,000, or nearly 50 per cent.

Aggregate assets of the national banks in June 30, 1928, are given as $28,508,239,000. Last year they were $26,581,943,000. In 1926 the total was $25,315,624,000 and in 1925 it was $24,350,863,000. In 1921 it was $19,120,300,000.

The following principal items appear in the statement of resources for this year: loans and discounts $15,144,995,000; U. S. Government securities $2,891,167,000; miscellaneous bonds and securities $4,256,281,000; due from other banks $4,202,315,000; cash $315,113,000.

While resources of the national banks have steadily grown, the number of banks in the system has declined. This year 7,691 banks reported. Last year there were 7,796 and the year before 7,978.

# PIT AND QUARRY FOREIGN DIGEST

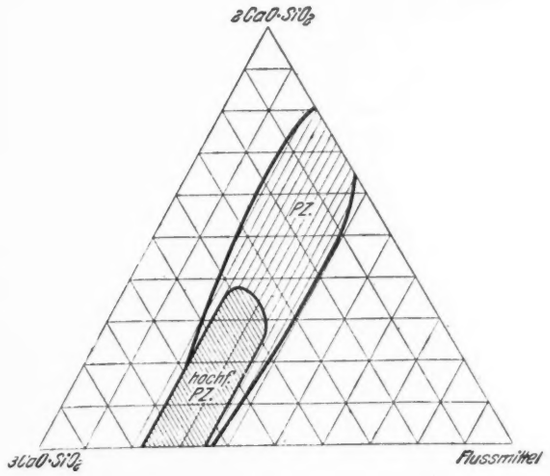


**Abb. 1. Felder für Portlandzement und frühhochfesten Portlandzement im Dreistoffsystem:**
**2 CaO $SiO_2$ — 3 CaO $SiO_2$ — Flußmittel**

Figure 1

## Graphic Raw Slip Calculation

A graphic method of calculating raw slip compositions has been devised which has the following advantages: 1. The constitution of the cement in question is immediately recognizable and its place in the three cornered diagram immediately determined. 2. Simultaneously it may be observed when the live content may safely be increased or whether it must be lowered. 3. The content of tricalcium and bicalcium silicates may be read off at once without calculation. 4. The relations between constitution and strength characteristics are classified. A not unusual method of graphical calculation is shown in Figure 1, where the lower left corner is 100% tricalcium silicate, the lower right is the "flux," that is, all other constituents than lime or silicate. Here is shown a narrow area representing Portland cements, with the shaded portion at the bottom showing the use of the rapid hardening Portlands of high early strengths. However, by using a right triangle instead of an equilateral one, the total clinker components may be represented. Figure 2 represents a Portland cement of this composition. $SiO_2$—21.5%; $Al_2O_3$—7.8%; Iron oxide—2.8%; CaO—64.5%; Ng—1.4%; gypsum 2.0%. This composition is represented by marking off 64.5% on the ordinates and drawing a parallel line to the base. The point P on line AB shows the content of lime and silica, the other components are marked as shown on AB with B the zero point. Frequently point P alone is sufficient as shown in Fig. 3. For calculation of raw slip from two components, an example may be taken with a limestone and blast furnace slag of the following compositions:

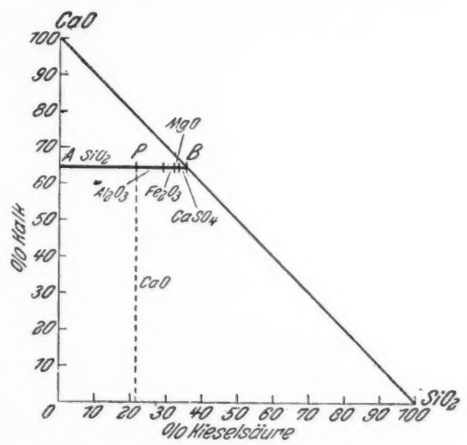


**Abb. 2. Rechtwinkliges, gleichschenkliges Dreieck mit Eintragung einer Brutto-Analyse von Portlandzement**

Figure 2

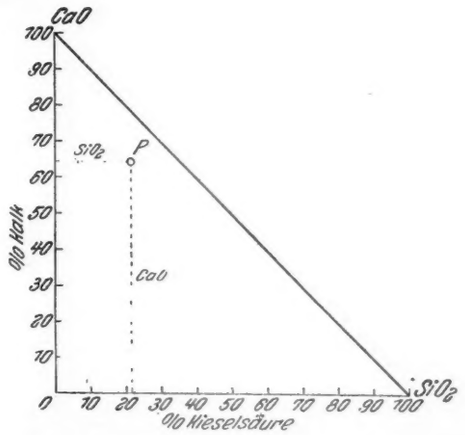


**Abb. 3. Rechtwinkliges, gleichschenkliges Dreieck mit Eintragung des Kalk- und Kieselsäuregehaltes eines Portlandzementes**

Figure 3

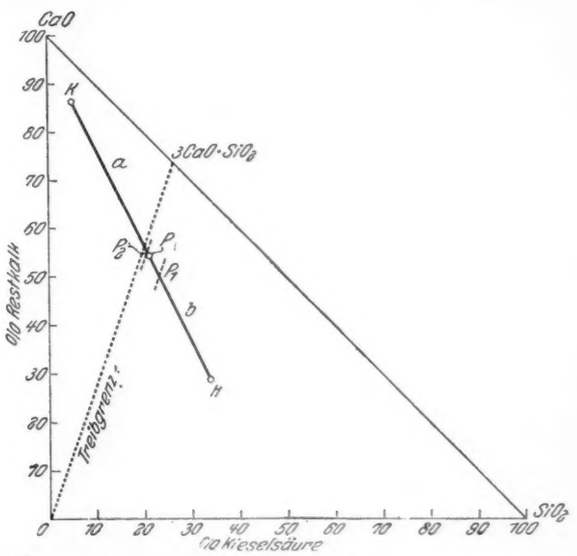


**Abb. 8. Graphische Rohmehlberechnung aus 2 Komponenten**

Figure 4

| Blast Furnace Slag H | | After Ignition |
|---|---|---|
| $SiO_2$ | 33.16% | 33.92% |
| $ALO_3$ | 9.10% | 9.31% |
| "$FeO_3$" | 4.62% | 4.73% |
| MnO | 0.18% | 0.18% |
| CaO | 46.55% | 47.61% |
| MgO | 4.16% | 4.25% |
| Residue | 2.23% | 0.00% |
| | 100.00% | 100.00% |

By calculation it is seen that 18.67% of the lime exists in combined form, 28.94% being free.

The limestone had the following composition:

| Limestone K | | After Ignition |
|---|---|---|
| $SiO_2$ | 3.00% | 5.09% |
| $AL_2O_3$ | 0.80% | 1.36% |
| "$Fe_2O_3$" | 0.32% | 0.54% |
| CaO | 52.40% | 88.81% |
| MgO | 2.48% | 4.20% |
| Residue | 41.00% | 0.00% |
| | 100.00% | 100.00% |

The bound lime being 2.62% and the free lime 86.19%. Two points are then located in Figure 4. K corresponding to 5.09%, $SiO_2$ and 86.19%, CaO and H, corresponding to 33.92% $SiO_2$ and 28.94% CaO. The line connecting these two points is the locus for all mixtures of this limestone with this slag. Previous considerations show that points on the line between P, and $P_2$ will give the most favorable hydraulic mortar, the dotted line indicating the maxima of the tricalcium silicate content. Point P may be selected as the optimum mixture. The distance of this point is then scaled off from K and H and the proportions of the two ingredients can be easily calculated, in this case, 42.91% of the slag, to 57.09% of the limestone. The clinker actually made in this way analyzes exactly according to the composition indicated by Point P. Three components may also be determined graphically in an equally simple manner.— R. Grun and G. Kunze (Zement, August 2nd and August 9, 1928.)

## Report of the Kiln Committee

During the past year the Kiln Committee of the Society of German Portland Cement Manufacturers continued their investigations of kilns, taking up in this interval an automatic shaft kiln, a calcining furnace with waste heat boiler, a rotary kiln for wet operation and a rotary kiln with slag raw materials, heated by hot air. The automatic shaft kiln was 40 ft. high and 8 ft. 6 in. in diameter. It was fitted with an air jacket through which the combustion air was preheated. The coal consumption for all the kilns was automatically measured and samples of coal taken regularly for analysis. The kiln was charged intermittently rather than continuously, and this accounts for fluctuations in temperatures of flue gas and of the finished product. The temperature of the flue gas varied from 80 to 250 degrees, with a C $O_2$ content of 22.6% and C O only 0.5%. The coal consumption was 17.9% of the weight of the clinker produced. This coal contained 6% moisture, 11.8% volatile matter and 10.7% ash. The capacity of this shaft kiln was about 0.7% of a ton per cubic yard. The rotary kiln with calcination chamber had a total length of 100 feet and a diameter of slightly more than 6 ft. in the narrow region with a calcining zone built as part of the kiln 36 ft. long and 11 feet in diameter. The boiler had a heating surface of 4,000 sq. ft., a superheater of 900 sq. ft. and a smooth tube economizer of 2,100 sq. ft. surface. The capacity of this kiln proved to be about 0.75 tons per cubic yard. The extraordinary amount of 41% of the waste heat was recovered in the form of steam from the boiler, making the consumed heat per unit clinker production less than half that of a kiln using the wet process without waste heat recovery. The rotary kiln using the wet process was 165 ft. long by 9 ft. in diameter. The raw slip contained 40.5% water and 76% C $O_3$. The production of the kiln was high, one ton per cubic yard, another experiment showed a capacity above this figure, but the heat consumption was greater than with the two previously described kilns. The kilns tested were found to be increasingly economical in heat consumption in the following order, the last mentioned using the least heat per unit of clinker produced.

1. Rotary kiln using wet process. 2. Rotary kiln using wet process with a blast of hot air. 3. Rotary kiln using dry process. 4. Shaft kiln. 5. Rotary kiln with waste heat utilization: E. Schott (Zement, August 9, 1928).

## Lime Incrustation on Concrete

To prevent lime incrustation on concrete and cement, and to improve the setting properties, ammonium carbonate is added in such quantities that the amount available for combination with the lime is equal to at least 5 per cent of the weight of the cement. In the case of cement washes the amount may be 25 to 50 per cent. For concretes, the ammonium carbonate may be mixed in the dry state with the dry cement, with the aggregate or with both; it may be added to the gauging water; or a saturated solution of ammonium carbonate may be applied to the surface of the concrete after it has set. The cement may be colored with vat dyestuffs. For example, 100 parts of cement and 300 parts of sand are gauged with 20 parts of water, and 10 parts of a saturated solution of ammonium carbonate are added. — White, Becket, Thomas and Scottish Dyes, Ltd. (British Patent 290,309.)

# INTIMATE NEWS OF MEN AND PLANTS

## New Texas Cement Plant Under Construction

The Republic Portland Cement Company was recently organized and will erect a new plant north of San Antonio, Texas, between the main lines of the M. K. and T. and the Missouri Pacific railroads and near the Austin highway. The plant will have a capacity of a million barrels a year and will cost approximately $2,500,000. The site which contains 600 acres has already been purchased.

Cement will be manufactured by the wet process and the major units will be two 11 foot by 250 foot kilns, four 8 by 7 by 40 foot grinding mills, two 10 by 100 foot coolers, and a large Dixie hammer mill. Orders for the kilns, mills and coolers have already been placed with the Allis-Chalmers Manufacturing Company of Milwaukee. Electrical equipment contracts have been let to the General Electric Company, Schenectady, and include four 800 horsepower, two 300 h.p., and eight 100 h.p. motors. A 7.5 ton P. & H. electric crane has also been ordered from the Harnischfeger Corporation, Milwaukee.

Construction is already under way, side tracks are being laid from the railroads, and two wells have been drilled for water. A modern community will be built to house the employees and will be known as Longhorn, Texas. Electric power will be furnished to a large sub-station which will be built on the property.

Engineering work is being done by Terrell Bartlett, San Antonio, and Richard K. Meade, Baltimore, is consulting engineer. Officers of the company are: J. H. Smith, president; W. M. Smith, vice president in active charge; F. A. Smith, J. W. Young and A. F. Sayers. The product will be marketed under the trade name of "Longhorn" Portland cement.

## New Washington Silica Plant Will Soon Operate

The H. P. Scheel Eversharp Pulp Burr Company, recently incorporated with a capital of $125,000, has leased the plant of the Washington Agricultural Chemical Company at Sedro-Woolley, Washington. The plant is being altered for the grinding of silica and the manufacture of silica products. The company also owns a deposit of silica about 13 miles east of Rockford.

The primary object of the new company will be the manufacture of the pulp burr, a wheel made of silica to be used in grinding wood pulp. This burr was invented by Mr. H. P. Scheel and is said to be harder than any grinder now in use in pulp plants. Art stone is expected to be another product. Mr. Scheel is president of the company.

## Finishing Lime Association of Ohio Tells Policies

The Finishing Lime Association of Ohio, with headquarters at Toledo, has published a booklet describing its relation to the building material merchant and the products he handles. A clear and concise history of the development of the lime industry and a description of the different forms of lime manufactured are interesting features. The marketing policies and membership code of ethics are presented in a straightforward manner, the standard of quality of the product and the sales ethics in particular being stressed.

## California Marble Deposit Being Tested

The contracting firm of Marsh Brothers, of San Francisco, is conducting tests on the Grant ranch two miles northwest of Columbia, California, with the intention of opening up a marble quarry if the quality of the deposit is satisfactory. Operations so far have revealed marble of good quality and satisfactory depth. Drilling is being done with a diamond drill and operations are under the supervision of John Brooks, former superintendent of the Bell-Columbia Marble Company.

## Massachusetts Granite Men Entertain

The Quincy Granite Manufacturers' Association of Quincy, Massachusetts, recently was host to a delegation of 25 Barre, Vermont, granite men. The program of entertainment, which covered three days, consisted of a boat trip from Nantasket to Boston where a ball game between the Chicago Cubs and Boston Braves was witnessed, banquets, a moonlight sail around Boston harbor, visits to many historical points, manufacturing plants, and quarries, and ended up with the annual outing of the local association at Nantasket. The visit was in response to one made to Barre last year by Quincy granite men.

## California Rock Plant Under Construction

The Calavera Rock Company, recently organized, is building a $75,000 rock crushing plant with a capacity of 500 tons daily on the Calavera volcano near Carlsbad, California. A high steel viaduct is to be built from the quarry to the plant and a macadam highway from the plant to the Vista-Escondido highway is under construction. Lee Walker and Tom F. Collins are in charge.

## Build New Montana Plant

The Bradford Company is building a sand and gravel screening and rock crushing plant on the Great Northern railroad right of way west of Great Falls, Montana. 2000 feet of side track are being laid by the railway at the gravel pit at Sun River over which the material will be brought to the plant. P. W. Bradford is president of the company.

## Asphalt Association Promotes

The Asphalt Association, with offices at 435 Whitney Central Bank Building, New Orleans, Louisiana, has appointed J. M. Page as Southern Branch Manager to succeed W. H. Rhodes resigned. The Southern Branch includes the states of Texas, Arkansas, Oklahoma, Louisiana, Mississippi and Tennessee.

## New Georgia Gravel Plant Under Construction

C. A. Goldsmith of Tallahassee, Florida, is building a sand and gravel plant on the bank of the Chattahoochee River, north of Fort Gaines, Georgia. Five miles of river bank have been leased and gravel will be procured from the river bed. A capacity of about ten carloads per day is planned.

## Keasbey and Mattison Appoint Sales Manager

William Jacobsen, formerly associated with the Asbestos and Mineral Corporation, has been appointed sales manager of the Fiber Department for the Keasbey and Mattison Company of Ambler, Pennsylvania. This company is sales agent for the Bell Asbestos Mines, Incorporated, at Thetford Mines, Quebec, Canada.

## Kentucky Fluorspar Company To Expand

The Klondike Fluorspar Company of Smithland, Kentucky, recently acquired valuable properties which will be developed in the near future. The concentrating mill was recently rebuilt and two new mine shafts opened.

At a recent meeting the following officers and directors were elected: Victor Olson, president; C. W. Danforth, vice president; J. R. Rowland, treasurer; M. Canfield, secretary. Other directors are: F. B. Moody, B. O. Olson, N. A. Kaercher, Joseph Perkins, and J. Weisent.

## New California Rock Plant In Operation

The Associated Rock Company has begun operation of its new $250,000 crushing plant in Big Tujunga Wash near North Hollywood, California. The plant is one of the most modern in southern California and has a capacity of 300 tons an hour. A fleet of 60 trucks will haul the crushed rock. H. W. Jones is manager of the company.

## Wisconsin Plant Opens Soon

The Nast Lime and Stone Company, which is erecting a plant east of Marblehead, Wisconsin, will be operating in about six weeks. Buildings and kilns have been erected and the overburden is now being removed.

## Plan New California Plant

Powel and Powelson, contractors of Pasadena, California, have leased 135 acres of land south of Monrovia as a site for a crushed rock plant. The plant will cost approximately $100,000 and will furnish rock and gravel for their own construction work.

## Booklet Describes Celite

The Celite Products Company recently published a 16 page illustrated booklet describing Celite and its uses in concrete, mortars, stuccos, and plasters. Illustrations give examples of various types of concrete construction in which it is being used.

Celite is a specially prepared grade of diatomaceous silica of high purity and uniformity. It is marketed in powder form and is added to concrete mixes for the purposes of increasing the workability of the concrete without the use of added mixing water, and of increasing the water tightness and the resistance to destructive agents of the concrete. Special grades of the same material are used for heat insulation and others for filtration purposes.

## Georgia Quarry Sold

H. H. Hoppendeitzel and Company, general contractors of Macon, Georgia, and their associates have purchased and taken over the France granite quarry between Sparta and Augusta. An expansion program to cost approximately $100,000 is planned. Products will be building stone, crushed stone, and curbstone.

## Colorado Marble Plant Sold

The United States Marble Company of Denver, Colorado, recently purchased the mill and crusher of the Fremont Feldspar Company at Canon City from Sylvanus Hynes. Additional machinery is to be installed and the plant is to be placed in operation soon to crush marble quarried in the vicinity. Roland Winburn is general manager of the plant and W. R. Winburn is superintendent.

## Build California Plant

The Coast Construction Company has commenced work on a sand and gravel plant at Olympia, California, that will cost about $3500. The Southern Pacific Railway is building a spur track into the pit and the sand will be loaded directly on cars for shipment. Bailey Hipkin is president of the company and Elmer Whittaker is vice president.

## Michigan Company Plans To Reclaim Sand

The Great Northern Mines Corporation has purchased the waste stamp sand of the Mass Mining Company at Keweenaw Bay, Michigan. A reclamation plant of 750 ton capacity is to be built for recovering the copper from the sand of which there is estimated to be about 5,000,000 tons.

## Marquette to Install Dust Collectors

The Marquette Portland Cement Company of La Salle, Illinois, recently provided its raw mills with Norblo dust collectors. It has just placed an order with the Northern Blower Company of Cleveland, Ohio, for similar equipment to render dustless the hammer mills, elevators, bins and scales.

## Gold Bond Lime Added To Gold Bond Materials

Intent on providing the building industry with a complete line of building materials under the Gold Bond name and protection, The National Gypsum Company of Buffalo, New York, announces the production of Gold Bond lime at the recently purchased plant and quarries of the Luckey Lime and Supply Company near Woodville, Ohio.

Gold Bond lime will be produced under exceedingly favorable conditions. The Luckey holdings and plant equipment has a valuation considerably in excess of half a million dollars. Equipped in the most modern manner, using lime rock of unsurpassed purity, operating under markedly efficient control, the Gold Bond lime plant is ready to produce in large volume under exacting scientific control. Gold Bond lime, like Gold Bond plaster, plaster board, lath board, tile board, insulation, plastic paint and the new ⅝ inch board, will be sold under a guarantee.

## California Lime Plant Improves

The Abramson-Bode Lime Company recently made extensive improvements at its plant which is located three miles east of Lindsay, Tulare County, California. The old quarry has been abandoned for a new one which is about 150 feet lower and a new tramway 650 feet long operated by gravity carries the limestone to the plant. The two 12 by 40 foot kilns are now being overhauled. According to Superintendent McEwen a new receiving bunker is to be built and later probably a new kiln.

## Pennsylvania Quarry Expands

The Andreas Quarry Company of Andreas, Pennsylvania, is enlarging its plant and expects to be running on a larger schedule of production in the near future. A new stone crusher and a lime hydrating plant have been installed and a narrow gauge railroad is under construction.

## Diamond Moves Offices

The Diamond Portland Cement Company has announced the removal of its general offices from Cleveland to Middle Branch, Ohio. A sales office will be maintained in Suite 1818 Williamson Building, Cleveland, Ohio.

## New Lime Hydrating Plant for New Brunswick

The Restigouche Company, Ltd., of Saint John, New Brunswick, has recently made a contract with the McGann Manufacturing Company, Incorporated, to install a complete Number 4 Schulthess hydrate plant. The Restigouche Company, of which C. A. Beatteay is general manager, is a subsidiary of the Fraser Lumber interests.

## John W. Boardman Passes

The Huron Portland Cement Company of Detroit, Michigan, announces, with sorrow and regret, the recent death of John W. Boardman. Mr. Boardman, who was vice president of the company and in charge of sales, passed away in the early morning of the third of August.

## California Gravel Plants Consolidate

The Daniel Contracting Company of San Francisco, California, recently purchased from Hacienda, Inc., a gravel bar on their property on the north side of Russian River near Hacienda. The purchasers also own the Independent Sand and Gravel Company and the Mirabel Gravel Company, both of which are near Forestville. Plans are to consolidate all of these plants and to build a new plant at a cost of $50,000 to $75,000.

## Cement Company to Build Storage Plant

The Huron Portland Cement Company plans to build a 150,000 barrel capacity storage and bagging plant at Buffalo, New York, in the near future. Cement will be received from the Alpena, Michigan, plant by boat, stored, and sacked for distribution in the Buffalo territory.

## Chicago Firm to Build Cement Storage Silos

The Wisconsin Lime and Cement Company of Chicago, Illinois, plans to build cement storage silos in that city at an approximate cost of $95,000. Plans for the project were prepared by the Burrell Engineering Company.

## Structural Gypsum Promotes R. W. Bentley

R. W. Bentley, superintendent of the Akron, New York, plant of the Structural Gypsum Corporation, has been transferred to Linden, New Jersey, where he will be head of the purchasing and traffic departments of the corporation. John W. Bentley of Buffalo will succeed him as superintendent of the plant.

## North Carolina Feldspar Plant Under Way

The Feldspar Milling Company, Inc., of Burnsville, North Carolina, which was organized some time ago to establish a feldspar grinding mill at Bowditch, is building the mill from its own plans. Contracts for the grinding machinery have been awarded to the Hardinge Company, York, Pennsylvania, and for motors and other electrical equipment to The Graybar Electric Company of New York.

More than 2,000 acres of land in the vicinity of Burnsville have been acquired, containing large deposits of feldspar and cyanite. The grinding plant will be equipped with a two-unit system with a daily capacity of 75 tons of finished spar and will be so constructed that a third unit can be installed when needed. C. P. Rogers of Tryon is president of the company.

## Keystone Installs Complete Dust Collecting System

The Keystone Portland Cement Company of Bath, Pennsylvania, is planning to install a complete dust collecting system which will extend to all departments. It has contracted with the Northern Blower Company of Cleveland, Ohio, to provide the Norblo type which will soon be placed in operation.

## Pennsylvania Lime Plant Organized

The Branchton Lime and Stone Company was recently organized by S. S. Smith of Mercer and James Lees of Pittsburgh, Pennsylvania. The new company will take over the plant and property of the Branchton Limestone Company at Branchton and will erect new kilns for the production of burned lime and hydrated lime as well as other limestone products.

## Alabama Plant Enlarges

The Alabama Sand and Gravel Company of Montgomery, Alabama, recently enlarged its pit operations and built a new plant to handle the increased production. Capacity is now 200 cars of washed sand and gravel per day. The new operations are on a tract of 725 acres of land adjoining the old property. L. L. Iddings, general manager of the company, designed the plant.

## Texas Cement Plant Expands

The Trinity Portland Cement Company plans to begin work immediately on a new addition to the plant at Fort Worth, Texas. The capacity will be more than doubled and will permit a maximum production of 3,500 barrels daily. A new kiln 250 feet long and 11 feet in diameter, as well as new grinding mills, motors and other machinery will be installed. The cost of these improvements is estimated at approximately $500,000.

Officers of the company are: W. H. L. McCourtie, president; Charles E. Urickson, vice president and general manager; and O. V. Bartholomew, general superintendent.

## New California Plant

The Pacific Rock and Gravel Company has started the construction of its new plant at Centerville, California. The estimated cost will be about $250,000. A spur track will be built to the plant from the Southern Pacific Railroad.

The plant is located on a gravel deposit of 68 acres and is expected to have a capacity of 1,500 tons per day. Organizers are Frank McHugh of Loring and Frank, Inc., of San Francisco.

## New Indiana Gravel Pit

Charles and Edward McClain of Lebanon, Indiana, are opening a gravel pit on the farm of Earle Brunes near that city.

## Vermont Slate Property Sold

The C. R. Beach Slate Company of Fairhaven, Vermont, has acquired all of the properties of the Auld and Conger Slate Company. These properties are located in Fairhaven, Poultney and Wells. Serial carriers to the shipping points and to the carriers at Raceville, New York, are included in the transaction. Operations on a large scale are expected in the near future.

## Plan Wyoming Granite Quarry

A firm consisting of W. F. and John E. Hershberger, formerly of Salida, Colorado, and Howard Crispin of Lander, Wyoming, plans to quarry granite from a ledge in the Big Popo Agie river canyon near Lander.

## U. S. Gypsum Opens New Office

The United States Gypsum Company has opened a district office in Omaha to serve the middlewest states. R. W. Tompkins is the district manager.

## Washington Crushing Plant Nears Completion

The rock crushing plant which the Weyerhaeuser Timber Company is erecting near Hemlock Pass, 25 miles east of Kelso, Washington, is nearing completion. Crushed rock from the plant will be used to construct roads for logging operations in that vicinity.

## Ohio Gravel Deposit Sold

The Cincinnati Sand and Gravel Company of Cincinnati, Ohio, recently purchased 140 acres of gravel deposits near Camp Dennison, from Mrs. L. B. Herschede.

## A. W. McThenia Appointed

The Acme Limestone Company of Alderson, West Virginia, recently appointed A. W. McThenia of Charleston as sales manager.

## New Corporations

Interstate Cement Corp., % Irwin Loeser (Mooney, Hahn, Loeser & Keough), 800 Nat. City Bldg., Cleveland, O. 5,000 shares n. p. v.

Southwest Stone Co., Chico, Tex. $60,000. W. F. Wise, H. C. Perry, N. D. Perry.

Kanauga Sand & Gravel Co., Kanauga, O. $25,000. E. Fellabaum, C. A. Zinn, W. A. Belt, Jr., H. R. Bloch. Has been operating for a short time.

Central Sand & Gravel Co., Columbus, O. 2,000 shares n.p.v.; $200,000 pfd. J. A. Menduni, J. D. Guthery, C. B. Norris, C. A. Weinman.

Forest County Gravel Co., 1120 Main St., Hattiesburg, Miss. $100,000. N. W. Rockett, J. V. Austin.

M. & M. Sand & Gravel Co., Enid, Okla. G. W. Monahan, L. F. Messman.

South Georgia Gravel Co., Leesburg, Fla. $10,000; 100 shares, $100 each. Knox Nurger, W. H. Horton, Chas. P. Lowell.

Oakwood Gravel Co., % Daniel I. Prugh, 206 Ludlow Bldg., Dayton, O. $25,000. Isaiah H. Bell, Clark J. Bell, Paul A. Nill.

Phosphate Recovery Corp., % U. S. Corp. Co., Dover, Del. 10,000 shares n.p.v.

Garner Electric Range Co., Lewiston, Kellogg, and Grangeville, Ida. 1,000,000 shares, $1 each. W. C. Garner, Pres. Developing talc mine at Grangeville.

Consolidated Feldspar Corp., % Corp. Serv. Co., Wilmington, Del. 350,000 shares n.p.v.

Coster Granite Corp., % V. F. Morreale, 1912 Arthur Ave., New York City. $10,000.

General Shale Products Corp., Johnson City and Kingsport, Tenn. $1,250,000. Merger of Johnson City Shale Brick Corp. and Kingsport Brick Corp. E. H. Hunter, V. P. and Gen. Sales Mgr.

Southern Clay Corp., Sandersville, Ga. $1,000,000. Wm. Roy Hale, 1819 Broadway, New York City, and associates. Acquired 400 acres and will establish plant for mining and washing kaolin.

Mission Ridge Brick & Tile Co., Lafayette, Ga. $100,000.

American Crystal Co., Caddo Gap, Ark. 1,000 shares n.p.v. W. D. Filkins, Caddo Gap; Dr. C. Lee Graber, Lakewood, O.; Walter C. Astrup. Wm. H. Hill, Cleveland, O.; B. L. Jones, Norman, Ark. To mine minerals, crystals, and rock near Caddo Gap.

## Massachusetts Granite Plant To Be Sold

The William N. Flynt Granite Company holdings at Monson, Massachusetts, have been ordered sold by Attorney Irving R. Shaw of Springfield, trustee. Fisk G. Rogers was given the authority to sell the property, which consists of about 500 acres of land, all underlaid by granite. The quarry, which was operated until 1924, was first opened by the United States government in 1804 to obtain stone for the foundation of the famous armory in Springfield.

## Texas Company to Develop Rock Asphalt Deposits

The Standard Rock Asphalt Company, with offices in the Brady Building, San Antonio, Texas, plans to develop 4,562 acres of land containing limestone rock asphalt deposits in Uvalde and Kinney Counties. Machinery will be installed at a cost of $20,000, and a supply yard will be built at San Antonio. A townsite will be laid out and mine buildings for workmen, a hotel, superintendent's home, commissary and other structures will be erected. Negotiations are being conducted with the Missouri Pacific Railroad for lines into the property. J. C. Arnold is president of the company and A. A. Ririe is chief engineer.

## Indiana Limestone Used For Huge Columns

The Indiana Limestone Company is filling an order for 36 monolithic column shafts for the north office building of the State Capitol group at Harrisburg, Pennsylvania. These columns are hewn out of solid blocks of grey Indiana limestone and when finished weigh about 36 tons each. They are 34 feet long and have a diameter of 4 feet 9 inches.

## British Columbia Quarry Planned

The B. C. Cement Company is exploring lime rock deposits on its property on the northeast end of Texada Island, near Courtenay, British Columbia, preparatory to commencing quarrying operations.

## Tennessee Shale Brick Plants Consolidate

The General Shale Products Corporation with a capital of $1,250,000 has been formed by the consolidation of the Johnson City Shale Brick Corporation of Johnson City and the Kingsport Brick Corporation of Kingsport, Tennessee. The new company will have an output of 300,000 brick per day, according to E. H. Hunter, vice president and general sales manager.

## New Texas Cement Plant Under Construction

The Monolith Portland Cement Company is building a $1,000,000 cement plant at Port Aransas, Texas, to make cement from shell deposits at that place and expects to have it in operation in about a year. F. L. Smidth and Company of New York City are the engineers in charge of construction. The Company also operates a plant at Laramie, Wyoming.

## North Carolina Farmers To Crush Limestone

A group of farmers in the vicinity of Murphy, North Carolina, have organized and plan to purchase a crusher to crush limestone for agricultural purposes. Work has already been begun opening up a quarry 1½ miles north of Brasstown Post Office. Directors of the organization are: W. T. Bumgarner, E. C. Meace, H. C. Moore, A. F. Padgett, and F. O. Scroggs.

## California Magnesia Mine To Reopen

The Sonoma Magnesia mine, nine miles from Cazadero, California, which has been closed for two years, will soon resume operations, according to E. E. Benjamin, former superintendent.

## Washington Cement Plant To Ship Rock By Water

The Pacific Coast Cement Company expects to receive the first cargo of lime rock from the company's quarries on Dall Island, Southeastern Alaska about October 1. The rock will be discharged at the plant which is now nearing completion on the East Waterway, Seattle, Washington. Two steel freighters have been purchased to transport the rock and one of them is to be converted into a lime rock carrier by the Pacific Coast Engineering Company.

# NEWS OF EQUIPMENT MANUFACTURERS

## Small Pumping Plants For Sand and Gravel

The Morris Machine Works of Baldwinsville, New York, is distributing its 12 page illustrated bulletin 129. It illustrates and describes several small sand and gravel plants in which Morris equipment is being successfully used. It is intended to assist small sand and gravel producers to more nearly designate the most profitable equipment, especially when operating in the beds of creeks and rivers where only a small amount of material is required, and it would be impractical to install an elaborate and expensive dredging and screening plant. Morris Machine Works offers its staff of trained engineers to the service of the industry and, for the purpose of simplifying this service, a comprehensive outline of the data required for cost estimates and recommendations is appended.

## A Compact Signal Relay

The General Electric Company has perfected a new signal relay, number CR-2904-F-1, designed for application where a small inexpensive device is needed to give a warning signal when power fails or voltage drops on an important circuit. The relay is of the solenoid type, with a laminated armature in three sections, fastened to a bakelite operating arm which raises and lowers the contact tips. By connecting a circuit through the contacts a bell, horn, light or other signal will give warning. The device is mounted on a molded compound base 1⅞ inches wide by 2½ inches high and can be used for either direct or alternating current.

## Boring and Turning Bars

The Scully Steel and Iron Company announces something new in boring and turning bars which are to be known as the Scully adjustable boring and turning bars for lathes. The bars are of one piece construction fabricated of special alloy steel with heat treated ends. The holders are so constructed that the bars may be adjusted over a large range. In addition to boring, these bars can be used for both external and internal threading.

## A New Automatic Air Filter

The Reed Air Filter Company of Louisville, Kentucky, is manufacturing the new Reed continuous filter designed for automatic air filtration for oil engines and air compressors. The filtering media, which consists of a continuous curtain of double woven wire panels overlapping six deep, is mounted on heavy chains and carried across the air passage between rigid angle iron slides. Its high cleaning efficiency is due to the fact that the air is forced to pass twice through the six double panels. The media moves at the rate of ¾ inches every 12 minutes, and just before reaching the cleaning tank the panels automatically separate and plunge into and through the filter oil, where they are washed clean before they are automatically reassembled for the next circuit. Units are made with capacities of from 2,800 to 20,000 cubic feet per minute.

## Morgan Engineering Promotes

A. F. Morris, formerly vice president and sales manager of the Morgan Engineering Company, Alliance, Ohio, has been made president of that company. S. F. Kallenbaugh has been made sales manager to take the place vacated by Mr. Morris. Tom J. Muir takes Mr. Kallenbaugh's place as assistant sales manager.

## Arc Welding Enters Building Field

Work has recently started on the first unit of a group of commercial buildings which will be erected on upper Carnegie Avenue, Cleveland, Ohio. The project, which includes a twenty story tower building, is being promoted by the Austin Company. The building, now being erected, is a four story structure which will house retail stores on the ground floor and offices on the remaining three floors. The front will be faced with Indiana limestone supported by a granite base course. Provision has been made in the design of the building so that every alternate column in the front of the store rooms can be removed, thus making available at any time either 17 feet or 34 feet wide store fronts.

By the use of arc welding for making all connections, all punching and riveting is being eliminated in the shop fabrication of the structural members; field bolts and rivets are also eliminated from all connections being made in the field.

Silent erection is fast becoming an important factor in favor of the arc welding process. The building is the first all welded steel structure to be erected in Cleveland and is the first commercial building so constructed in the country. The structural steel was manufactured in the fabricating shop of the Austin Company, and the arc welding is being done at the mill and in the field by The Lincoln Electric Company.

## Prest-O-Lite Company Adds Two New Plants

The Prest-O-Lite Company, Incorporated, has lately added two new plants to its nation-wide chain, making the total 33. These will serve nearby industry with dissolved acetylene, used in oxy-acetylene welding and cutting. A plant in charge of H. A. Smith at 631 South 17th Street, Harrisburg, Pa., started production July 12, and another at 17th and West Lawrence Streets, Allentown, Pa., J. W. Summers, superintendent, commenced operations July 21.

## An Interchangeable Shovel

The Harnischfeger Corporation is distributing an illustrated 2 page reminder of the P and H ground hog which is claimed to be "interchangeable too." This means that it may be used as a clamshell, crane, pile driver, shovel or dragline. It is of the same material and workmanship as the heavy duty machines, and is the result of 40 years experience in building such equipment. It includes a 50 h. p. motor, a patented crowd and has a high line speed of 155 feet per minute or a full circle swing of 5½ r.p.m. The real purpose of the reminder is to call attention to bulletin GH-1, which is a carefully prepared treatise on the uses of the ground hog and its adaptability to various conditions.

## C. Kemble Baldwin Dies In Los Angeles

C. Kemble Baldwin, chief engineer for the Robins Conveying Belt Company, died in Los Angeles, August 9th. Mr. Baldwin entered the service of the Robins Conveying Belt Company in 1898 and through those 30 years, he devoted his energies to the problems of material handling with conveyors. During his period of service, the capacities of conveyors and vessel unloading machinery were increased tenfold and few, if any, persons can be credited with making a larger contribution than Mr. Baldwin. He was a member of many technical societies, including the Western Society of Engineers and had a remarkable collection of works on aviation.

## Roll and Crusher Data

The C. G. Buchanan Company, Incorporated, 90 West Street, New York City, which specializes in the design and construction of complete crushing plants, is distributing four illustrated bulletins. These bulletins should be of considerable interest as they deal with the crushing problems that continually confront the industry.

Bulletin 90 contains 16 pages devoted to the description of crushers ranging in size from 4 by 12 inches to 18 by 36 inches, which are known as type B crushers. The crushers described in bulletin 90 are of similar design and sufficient space is devoted to state the object in building these crushers and the different duties each size will perform, together with weights, horsepower and dimensions. Among the special features of this type of crusher enumerated are the reinforced head, the long toggles with their slight angle and a longer eccentric throw.

Bulletin 110 comprises 20 pages devoted to the description of type B jaw crushers with openings from 36 by 48 inches to 66 by 84 inches, or larger. The design of these large crushers was made necessary by the advent of the modern shovels which load large rocks, weighing from two to five tons, into special cars to be dumped directly into the preliminary breakers. The frames, heads and parts subject to strain and stress are made of the best quality of open hearth steel thoroughly annealed. The principal feature of these crushers is the patented adjustable jaw stroke which is employed in all types and sizes of Buchanan crushers.

Bulletin 130 devotes 16 illustrated pages to the description of the type C crushing rolls which are said to be built with one idea, "They must be dependable." In these crusher rolls, the strain from crushing is resisted in every direction by solid, continuous walls of metal of unusual strength and rigidity. Other features of interest are the extra large shaft of hammered steel, large and removable phosphor bronze bearings, patented swivel pillow blocks which cannot cramp, positive fleeting device, quick and non-loosening shim adjustment and removable shells of chrome, manganese or special hard steel.

Bulletin 140, type E crushing rolls, contains 16 pages which describe a type of rolls designed not only to provide larger capacities, but to take up the severe strains accompanying the crushing of large tonnages of hard rock and ore. Crushing rolls offer special advantages where certain conditions are met: size of material feed must be within the angle of nip that the rolls are capable of grasping without slippage; reduction ratio must not be greater than 4 to 1 on hard material; and the feed must be fairly uniform such as a revolving screen or regulated bin discharge. Roll surface pressures in these machines cover a wide range, varying according to spring compression. Each lineal inch of roll surface develops a pressure of from 12,000 to 36,000 pounds which means a crushing strength of from 35,000 to 100,000 pounds per square inch of effective surface.

## Prest-O-Lite Flood Light

The Prest-O-Lite Company, Incorporated, New York City, announces a flood light attachment of new design for use with the small tanks of dissolved acetylene, which are available from service stations. By the connection of the attachment a convenient, portable, powerful flood lighting unit is obtained which can be used for illumination in dark places and for facilitating night work. Universal adjustment is obtained with only one swing joint, and because of its position near the center line of the tank, the attachment itself can be used as a handle in carrying the entire unit. The reflector, which is 10 inches in diameter, can be taken off by removing a single knurled nut.

## Power Plant Superheaters

The Superheater Company of New York City is distributing a 51 page bulletin, T-1, which describes and illustrates the design, construction, and application of the Elesco superheater to power plants. Much of the introductory part of the catalog is concerned with the elementary phases of the subject such as a discussion of the company and its arrival at the superheater idea; an explanation of superheated steam; the effect of superheated steam on steam consumption, boiler efficiency, steam transmission, turbine performance; and how to increase the capacity. Considerable space is devoted to the application of the superheater to different types of boilers.

A number of constructional advantages for this particular type of superheater are advanced. It is said to be located in the most favorable zone for the degree of superheat desired and for uniformity; there are fewer joints to be maintained, the type of joint used has been proved most efficient for high pressures and temperatures; in most cases, all joints are located outside of the boiler setting; uniform distribution of steam at all loads; highest heat transfer rate without objectionable cores; soot troubles and draft losses are reduced to a minimum; little or no weight on boiler tubes; and it is easy to install and inspect. It is said to have been designed by superheater experts to meet the specific requirements in superheating steam.

## Dana with Robins Conveyor

Richard H. Dana, formerly vice president and treasurer of Hodge and Dana of New York City, has become allied with the Robins Conveying Belt Company. He will specialize in the engineering and sale of screens in which business he was actively engaged with the former company.

## Removing Moisture from Bins Cuts Costs

With the present tendency towards more careful analysis of what were formerly considered mere minor details, cement mill executives have discovered that operating costs can be decidedly reduced and output increased, of which one is the accumulation of moisture. The trouble is mainly in damp weather, and the consequent clogging of equipment often causes delay.

For dry process operation, it is necessary to remove all moisture from the rock in the dryer, which is often difficult. The air at the front of the dryer may be around 600 degrees, whereas the air at the far end of the dryer is around 150 degrees. The more efficient the dryer, the greater will be the utilization of the heat and consequently the greater the temperature drop. The moisture contained in the rock is gradually driven off as drying proceeds, and passes out to the stack, but air at 600 degrees will carry considerably more moisture in suspension than air at 150 degrees and, as a result, condensation takes place in the stack.

To avoid this, an interesting application of air circulation was made by the Lawrence Portland Cement Company of Northampton, Pennsylvania, when the Norblo dust collecting system was recently installed. At each of the stack bases, bins, etc., where condensation might be expected to take place, a small draft of vent pipe was put in. It was found that, although comparatively little power was required, the small amount of air circulation was quite sufficient to absorb the excess moisture, and that the trouble had been eliminated.

## Byers Completes Expansion

The Byers Machine Company of Ravenna, Ohio, will soon have completed a reorganization of the business to include both the Ravenna plant and the one at Massillon, formerly the plant of the Massillon Power Shovel Company. The equipment has been removed from the Massillon plant to Ravenna where 15 additional acres have been secured from the National Carbon Company. A number of buildings on the new site, together with some foundry space, enables the company to consolidate its operations for greater speed, economy and efficiency.

President H. C. Beckwith has advised that the Massillon plant will be immediately closed as soon as the changes are completed and the full line of gas and steam equipment from the ⅝ to the 1¼ yard size will be made in the 20 acre plant at Ravenna. Production of some of the Massillon lines was started in July and continued during the removal. Due to the fact that gray iron castings are used less in power shovels, cranes and other pit and quarry equipment, being superseded by high grade alloy steel castings, rearrangement of the plant will require little new building.

## Screw Pump for Low Head

A recent development in pumping equipment for handling large volumes of water at low head is a self contained vertical screw pump unit called the Everglades screw pump, which has just been announced by Fairbanks, Morse and Company. Although this pump, which is manufactured only in the 24 inch size, is designed mainly for irrigation and drainage service, it can be used for any type of pumping where the head is not over eight feet. It has cast iron spiders, carrying a Wood screw type impeller and diffuser, and is constructed in such a manner that, four wooden corner posts are fastened to the spider and the structure boarded up so that it may be placed vertically in a ditch or stream and arranged to discharge over the top of a levee, or embankment.

A wooden box construction is used for the casing and boards on two opposite sides of the box are permanently fastened to the frame posts, but those on the other two sides can be arranged to suit different operating conditions. The inside dimensions of the box, are 25 inches square by 12 feet high and fitted with 4 by 4 inch corner posts. The intake opening is 17 inches by 28½ inches, while the discharge opening is 17 by 18 inches although the latter can be adjusted.

The Huron Seal Ring

## Huron Seal Rings Described

The Huron Industries, Inc., of Alpena, Michigan, in a booklet recently published describe Huron seal rings for rotary kilns and driers and their operation. These rings are unique and operate on the gravity principle and, while providing all the necessary pressure to seal effectively, do not cause extreme wear through excessive pressure, as is claimed to be the case in most seal rings which operate by the use of springs or some other means.

The principal parts of a Huron seal ring are the wall plate, seal ring, trolley, bracket and joint ring. The wall plate is bolted to the furnace wall by anchor bolts inserted in the concrete or masonry. It is made in halves bolted together so that it can be attached after the kiln is installed. The seal ring is mounted on the outside of the wall plate and is also made in halves. A pivot on each side rests in a ball bearing which is inserted in a trolley. The trolley has two roller bearings which carry it back and forth in a slot on the bracket. The bracket is bolted to the furnace wall with anchor bolts and guides the movement of the seal ring. The joint ring, which is split for the same reason as the wall plate and seal ring, is bolted to an angle iron fastened to the kiln.

No springs are employed in these seal rings. The bracket on which the trolley moves is bolted to the furnace wall with the same slope as the kiln. This slope applies a force of gravity which causes the seal ring to exert a sufficient pressure against the joint ring to effectively seal the opening.

Installations of these seal rings are said to have materially cut down the fuel costs in many cement and lime plants by keeping outside cold air out of the kilns and driers where it would interfere with proper combustion and temperature. Instances are cited in which these rings required no repairs, adjustments or lubrication after years of use. Huron seal rings may also be efficiently applied on any rotary cylinder where excess free air should be excluded.

## Crushers, Screens and Gates

The Good Roads Machinery Company of Kennett Square, Pennsylvania, is distributing an illustrated 48 page catalog that describes its equipment. It includes crushers, screens, elevators, belt conveyors, apron feeders, chutes and gates for bins and several pages devoted to photographs of Good Roads equipped plants.

Champion crushers are made in sizes from 7½ by 13 inches to 22 by 50 inches to suit a peculiar crushing problem. The Number 1030 is the latest addition to the Champion line of which it is said to embody simplicity, compactness, strength and efficiency as its predominating features. It has only three moving parts and, while it has a capacity of 25 tons per hour, it may be assembled in a small space; strength is obtained by a knowledge of the quality of the tested materials used in the manufacture and their relation to each other; Timken tapered roller bearings are used in the moving jaw and SKF self aligning roller bearings support the eccentric which, together with Alemite lubrication, makes the 1030 a completely equipped roller bearing crusher. The eccentric shaft is forged in one piece from special heat treated alloy steel. The moving jaw is cast heavily ribbed of open hearth steel; the stationary jaw is heavy, cast from open hearth steel and has a wide key machined on each side engaging corresponding keyways cut into the side plates. Side plates are of a special formula high carbon rolled steel of the same special quality as is used in all Champion crushers and cheek plates, which are renewable, are made of ¾ inch manganese steel. Corrugated manganese steel dies are ground on back to accurately fit against machined surface of moving and stationary jaws and so designed that fine materials can be produced with a minimum of dust and wear. A heavy cast toggle chilled on wearing surfaces and accurately ground, fits the machined steel seats in moving jaw and toggle block, and the toggle block, which is of open hearth steel, is located back of the moving jaw and attached at either end to the side plates. Two heavy flywheels, with split hubs are keyed to the eccentric shaft and an 18 inch diameter by 8 inch face pulley may be bolted to the spokes of either flywheel for driving an elevator.

Climax steel rock crushers are made in three sizes, 9 by 16 inches, 11 by 20 inches and 12 by 26 inches. They are simple in design, light in weight, low in maintenance and give long and economical service. Although they were first designed and constructed several years ago and many improvements have been made, yet a number of the early machines are in active service.

Champion roller screens, which are made in 40, 51 or 60 inch diameter, were designed for wet or dry screening such as scalping or sizing, but scrubber sections may be used if desired. This screen is propelled entirely by friction applied through two, three or four sets of rollers coming in contact with traction rims around the body of the screen. Gear driven screens, which come in 24, 30, 36, or 48 inch diameters, were designed for use in lighter service and smaller capacities than the roller driven or heavy duty types. Where conditions demand, they are supplied with scrubber sections for thoroughly washing the material. The heavy duty screen was designed for use under severe conditions and large capacities and is supplied with a 4 or 6 foot scrubbing section. The diameter of the screen is 48 inches and it comes in 10 to 27 foot lengths. It is driven by a bevel gearing at the discharge end and the driving pinion is of steel and cast integrally with the stub shaft.

Champion bucket elevators, for elevating sand, gravel and any abrasive material, are mounted on rubber belt. For crushed rock or materials of a non-abrasive nature, the buckets should be attached to single or double rows of chain. Climax elevators, which are made in three sizes, are of the continuous bucket type for handling stone, sand, gravel, slag and various materials of a like nature. They are said to be strong, durable and thoroughly dependable in operation.

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## Creeper Wheel Described

The Creeper Wheel Company of Reading, Pennsylvania, is distributing an illustrated pamphlet and catalog, Number 4, a twenty page illustrated booklet, describing the "Creeper Wheel." This is an endless track arrangement so designed that no rollers, roller guides or guide wheels are necessary to keep the belt rigid, in this way eliminating much friction and weight.

The belt is constructed of tension members of forged open hearth steel running on two pairs of track wheels. The tension members are forged open hearth steel, heat treated and oil quenched and the pins are made of hardened rolled alloy steel. The track wheels are of electric alloy steel and run on Hyatt roller bearings and the chassis beam is of electric alloy steel.

A unit consists of two wheel assemblies and one axle assembly and is made in 4, 6, 10 and 15 ton sizes. The catalog and folder illustrate a great variety of body types made to be used on this unit. These range from special stake trucks for hauling sugar cane to heavy steel bodies for hauling rock. For use where the soil is extremely light, creeper wheels with extra wide treads are furnished.

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## A New Swing Crane Described

Frederic H. Poor, Incorporated, of 50 Church Street, New York City, is distributing an illustrated 4-page folder that describes the Loadmaster swing crane. It is set forth in the folder that this crane was designed to meet a growing need in the industrial field for a small, general utility, locomotive crane. It is moved by its own motive power and the power for lifting and swinging loads is derived from the tractor engine.

Thorough consideration was given to sturdiness and stability, beginning with specially weighted wheels to counterbalance the loads in suspension from the boom and broad tires to sustain the loads. The frame for the mast consists of fabricated plate and channel structure, secured at the rear to the axle housing of the tractor. The hoisting drum is direct connected to a self locking gear and is operated through a clutch and bevel pinions by a control lever. The swinging boom is constructed of two channels, firmly braced, and equipped with sheaves and hook weight. The bull wheel by which the boom is swung is power driven through chain and sprocket, and equipped with an expanding brake. An important feature is that all operations are performed by power from the tractor engine, and all controls are in reach of the operator.

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## New Socket Wrench Set

A new heavy duty set of socket wrenches, made of CV chrome vanadium steel, is being manufactured by the Bonney Forge and Tool Works, Allentown, Pennsylvania. The set is composed of ten sockets, running in size from 15/16 inch to 1⅝ inch opening. It is specially designed for extremely hard service and as the name Hercules implies, is so proportioned that although light in weight it has a heavy reserve strength factor. The set consists of ten sockets, ratchet handle and a short and long extension sliding T handle.

## Hoist and Compressor Data from the O. K. Builders

The O. K. Clutch and Machinery Company of Columbia, Pennsylvania, which claims to stand on the platform of simplicity, durability and service, is distributing its 32-page illustrated catalog Number 28. The catalog gives important information on friction and reversible single, double and triple drum hoists for all purposes, dragline scraper hoists, slackline cableway hoists, portable elevators and portable air compressors. For operating these machines, a.c. or d.c. motors of the slip ring or squirrel cage type, or gasoline engines suitable for the proposed duties are supplied.

It is pointed out that the successful performance of a large number of O. K. hoists has proved the merits of the drum thrust mechanism and double cone asbestos frictions, used on these hoists, which are made of special nonburning asbestos, are attached to cone shaped flanges that are integrally cast with the drum gear and are ventilated for cooling. Drum gears have wide hubs, keyed on the shaft and pressing against a shoulder on the shaft. The thrust levers are clamped to the thrust screws which are made of steel with accurately milled standard double threads. The inner end of the thrust screw, which is hardened, acts on a thrust key of tempered steel, forcing the drum laterally on the shaft and engaging the drum with the V type frictions. The end thrust ball bearing receives the forces of thrust, eliminating friction and causing the drum to operate more easily. Gears have machine cut teeth and are pressed on to a tapered key on drum shaft and hub of gear butts against an immovable shaft. Drums are made of semisteel, are well balanced and smooth and the friction surfaces are accurately machined to fit the asbestos frictions. The ratchet is made of semisteel and flanged so the pawl cannot slip, and the pawls are made of solid forged steel and are so balanced that they automatically release the drums when relieved of the load. All main bearings, which are of the split type, are extra long and babitted with antifriction metal. Side stands are of extra wide box type construction, made of heavy steel, and are interchangeable.

The engines on all hoists over 15 h.p. are mounted on cast iron beds, securely anchored to the hoist side stands and both engine bed and hoist stands are mounted on an electrically welded steel base. A standard heavy duty, industrial type multiple cylinder gasoline engine is geared direct to the hoist where a gasoline engine is preferable. All engines are equipped with carburetor, air cleaner, high tension magneto and an automatic governor. Every gasoline engine is fully tested and will develop its full rated horse-power and capacity at given hoisting speeds. A reduction gear housing with gears running in oil is used on all gasoline engines and all shafts in this housing turn in Timken roller bearings. Where electric power is available and desirable, the motors used are especially designed for the particular service required.

Portable air compressors are built by this company in three popular sizes, having piston displacements of 120, 160 and 265 cubic feet. A unit is mounted on a standard four wheel steel truck of sturdy construction. Air valves of the twin disc type are used. As these compressors are designed to work at capacity in all climates, both cylinders are completely surrounded by water jackets and both suction and discharge valve pockets have water jackets on all sides.

Both the engine and compressor are equipped with air cleaners and all bearings bronze backed, die cast and replaceable without the necessity of pouring or scraping. Cylinders are of close grained grey iron, accurately machined and of sufficient strength and thickness with removable heads. The oiling system for these compressors is positive and automatic and a sufficient supply of oil is assured even when the compressor is not standing level.

## General Electric Issues New Bulletins

The General Electric Company is distributing the following six new bulletins: GEA-556A describing an automatic arc welding head of the magnetic clutch type; GEA-874B describing the Type WD-200A arc welder, belt, motor, or gas engine drive, stationary or portable; GEA-1009 the WD300A gas engine driven electric arc welder; GEA-1031 describing the Type AW resister arc welders.

Bulletin GEA-37C describes the Types RRB and RRC direct heat electric furnaces for heat treating, carburizing and annealing various metals; firing vitreous enamel; annealing glass; and other heating operations requiring temperatures below 200 deg. Fahrenheit.

Bulletin GEA-844 describes the CR7009B12 across the line type magnetic reversing switch for single, two and three phase motors with temperature overload and undervoltage protection. This switch was described in a previous issue of this magazine.

GEA-19E, which supersedes GEA-19D, describes and illustrates the CR7006-D4 and D5 a.c. enclosed magnetic switches. These are suitable for starting small single, two or three phase a.c. motors that can be thrown directly on the line.

GEA-874B, which supersedes GEA-874A, is concerned with the type WD-200A arc welder. It may be advantageously used in any industrial or repair plant using iron or steel. It may be belt, motor, or gas engine driven and used as a stationary or portable unit.

## Lakewood Products Described

The Lakewood Engineering Company of Cleveland, Ohio, is distributing an illustrated, 56 page catalog, Number 16-A. It especially describes the narrow gauge cars, track, trailers, trucks and skids that are manufactured by the company. Rocker dump cars, known as 241-B, for locomotive haulage, are equipped with 14 inch diameter chilled wheels, bronze bearings, double spring pedestals, high carbon axles, cast steel link and pin couplings and spring type draft rigging. They dump at an angle of 45 degrees, have 3/16 inch plate, heavily reinforced bodies and are made in 1½ and 2 yard capacities. It also describes several types of cars for hand haulage, tunnel work, end dump cars for mines and quarries and a number of cars for miscellaneous purposes. Narrow gauge track with all the necessary auxiliary equipment is also described in detail.

Trucks and trailers for industrial purposes, warehouses and various other purposes, together with different types of buggies, are treated at considerable length. Concrete buckets of various types and special mixers with worm speed reduction are fully described, together with bin gates for attaching to wood or metal bins, hoppers or bulkheads where loose material, such as sand, stone, gravel or concrete, is to be discharged.

## Universal Moves Offices

The Universal Crane Company has announced the removal of its general sales offices. They have been moved from Cleveland, Ohio, to the corner on 28th at Fulton Street, Lorain, Ohio.

## Boiler Companies Merge

The consolidation of the Casey Hedges Company and the Walsh and Weidner Boiler Company of Chattanooga, Tennessee, has recently been announced. The Hedges-Walsh-Weidner Company unites the combined experience of nearly two half centuries of boiler making.

## Joseph Andrew Jeffrey

Joseph Andrew Jeffrey, chairman of the board of directors and founder of the Jeffrey Manufacturing Company, died at his home, 1440 East Broad Street, Columbus, Ohio, Monday, August 27th, at the age of 92 years.

Mr. Jeffrey was born in Clarksville, Clinton County, Ohio, January 17, 1836, and received his elementary education in the public schools of that county. He completed his high school course in Auglaize County. In 1858 he came to Columbus where he secured a position in the office of Rickley and Brother, bankers. He remained with this firm for five years as bookkeeper, teller and cashier, when he became associated with and purchased a fourth interest in a wholesale and retail carpet and furnishing establishment. After three years he sold his interest and with the firm of Rickley and Brother organized and established the Commercial Bank, now the Commercial National Bank. In 1883 Mr. Jeffrey acquired controlling interest in the Lechner Machine Company of Columbus and changed its name to the Jeffrey Manufacturing Company in 1887. In 1900 Mr. Jeffrey retired from the presidency and became a member of the board of directors. He also was owner of the Ohio Malleable Iron Company, a stockholder, vice president and director of the Commercial National Bank and a stockholder and director of the former Ohio Trust Company.

He was for five years a trustee of the Protestant Hospital, the Godman Guild, the Children's Hospital, and the Columbus Humane Society, and was a former director and trustee of the First Congregational Church, of which he and his family were members. He was a member of the Columbus Club, the former Ohio Club, the Arlington Country Club, the Columbus Country Club, and the Athletic Club.

Mr. Jeffries was married October 2, 1866, to Miss Celia C. Harris of Columbus. In addition to his widow he is survived by five children. They are Robert Hutchins Jeffrey, president and general manager of the Jeffrey Manufacturing Co.; Joseph Walter Jeffrey, vice president; Malcolm Douglass Jeffrey, assistant sales manager; Mrs. W. Wilson and Mrs. Frederick Shedd.

## Sauerman Scraper Systems Described

Sauerman Brothers, Incorporated, of Chicago, Illinois, has published Catalog number 11, a very complete and profusely illustrated booklet of 56 pages describing the storage and handling of coal and other bulk materials by means of Sauerman power drag scrapers. The name, Catalog, in this case is rather misleading, however, because the booklet is more than that. Numerous photographs, and plan and elevation drawings illustrate different types of installations of all sizes in use for handling practically all kinds of materials, in addition to descriptions and specifications of each individual piece of equipment. A table is also included by means of which the capacity in tons per hour of an installation can be determined if the horsepower of the motor and the average haul per trip in feet are known. In addition to coal, some of the other bulk materials now being successfully handled with Sauerman equipment are: Ashes, bulk cement, broken tile, cinders, coke, culm, clinker, crushed rock, fertilizers, fire clay, foundry sand, gravel, gypsum, glass sand, heavy chemicals, lime cake, mine tailings, ores, slate, salt, sulphur, and wood chips.

In storing material on the ground with a scraper, the initial pile is usually formed on the storage area, which need be of no certain size or shape, by discharging the material from an elevator, belt conveyor, skip hoist, pivoted bucket conveyor, grab bucket, by spouting from bins, or by dumping from cars on a trestle. The scraper then drags the material from the initial pile, which is usually formed at a given point, and distributes it in layers over the entire area, forming a solid pile of any required height. For reclaiming, the scraper is turned around and drags the material to the reclaiming point, which is usually a hopper feeding a conveyor or elevator and is usually near the point where the initial pile is formed. In many installations the scraper drags the material up an incline, dumping it into a hopper or trap from which cars or trucks are loaded. Several separate storage piles may be formed, permitting the storage of different sizes and kinds of material with the same equipment. Installations are as easily adapted to indoor storage as to ground storage.

Changing from storing to reclaiming or vice versa is easily accomplished by reversing the cables on the scraper, which causes it to turn around and begin reclaiming when the hoist is again placed in operation. The cables are of the same length but pull the scraper at different speeds, one drum of the hoist having a higher speed than the other. Sauerman scraper storage systems are built in twelve standard sizes with capacities up to 1,000 tons per hour.

The design of the Crescent scraper is based on the same principle as that of the plowshare. It extends all around its load and by its shape exerts a pressure toward the center, preventing any movement of the material in the bucket. Wear is practically eliminated as the scraper has no bottom; this, as well as the fact that it has no top, connection angles, or reinforcing bars, also enhances its lightness. Provision is made for the attachment of manganese steel teeth. Scrapers for handling other materials than coal are of a heavier type and are regularly equipped with teeth. These scrapers are made in sizes of from 1/3 to 12 cubic yards.

The wire rope used for the operating cables is the Sauerman "Special Excavator" brand. This cable is of special design and is internally and externally lubricated. The sheaves are of electric furnace alloy steel and are fitted in cast steel housings so designed as to allow the sheaves free swing. The smaller sizes have phosphor bronze bearings and bronze thrust rings while the larger sizes have tapered roller bearings. All of them have reservoirs for lubricant and have high pressure lubrication.

The head post of a Sauerman scraper installation is of plate and channel construction, and is made in many designs and sizes to suit conditions. Tail towers, self propelled or otherwise, and back posts with bridles are also designed for each installation.

The scraper power units are made in two types, the standard having a line speed on the front drum of 300 f.p.m. and on the rear drum of 600 f.p.m. The other type has the same line speed on both drums but is used much less frequently. Both types are designed to be driven by electric motor, belt, gasoline, steam or oil engine, and are made in twelve sizes. A remote control system operated by either electric current or compressed air is featured.

## Sling and Crane Chains

The S. G. Taylor Chain Company of Hammond, Indiana, is distributing an illustrated 4 page folder which gives some timely advice regarding "Safety First with Reference to Sling and Crane Chains." In addition to a table on safe loads, the following suggestions are appended: Distribute the load evenly on both legs; keep chains free from twists and knots; inspect chain at regular intervals; every time a chain is overloaded, it is weakened; a clean chain lasts longer; and work with the safety committee. The folder also contains particular information regarding the Taylor Mesaba single and double sling chains.

## Gasoline Locomotives Described

The Geo. D. Whitcomb Company of Rochelle, Illinois, in Bulletin 2822 describes the 2½, 3½, 4½ and 5 ton gasoline locomotives. These models all have Continental Red Seal, 4 cylinder heavy truck engines and a special reverse gear making the same speeds available in both directions. They are built in standard gauges of 18 to 42 inches.

The frame and bumpers of the 2½ ton model are of structural steel, while in the larger sizes they are cast integral and are of heavy section. The drive on the 2½ ton model is by a single chain from jack shaft to rear axle and another chain from rear axle to front axle. The larger models are driven by a double chain from jack shaft to rear axle and from the rear axle to the front axle by a single chain.

The radiator on the 2½ ton is of the one-piece heavy duty truck type, while those on the larger models are of the artillery sectional type. The axles are of A. R. A. specification steel and the wheels are cast iron with chilled treads on the 2½ and 3½ ton, and forged steel on the 4½ ton and 5 ton models. Axle bearings are Hyatt and the journal box cast iron.

The complete specifications of each of the four models described in this bulletin are given and a few other types are also described briefly. A table gives the hauling capacity in tons of each locomotive.

## Perfex Advances Birdsell

D. T. MacLeod, president of the Perfex Corporation, builders of heavy duty truck and industrial engine cooling radiators, announces that at the last directors meeting, Roger Birdsell, sales manager of the corporation, was elected to the directorate and made vice president.

## A Standard Suction Dredge

A simple and effective 12 inch steel suction dredge has been designed and placed on the market by the Tampa Shipbuilding and Engineering Company of Tampa, Florida. Three of these are now in use and two more are under construction. This dredge is said to have delivered 165,000 cubic yards of sand and shell in thirty days. It is correctly designed so that sharp ells are eliminated. It is equipped with a cutter with self sharpening renewable plow steel knives, winch with large friction surfaces and most convenient lever arrangement, and Timken roller bearings are used.

These dredges are operated by Anderson Diesel engines of 240 or 300 h. p. and pump through 4500 feet of pipe when using 300. The hull is built of copper bearing rust resisting steel and so designed that it can be taken apart into three longitudinal sections and shipped by rail over land. There are two 6,000 gallon fuel oil tanks built into the hull below steel deck as well as two fresh water tanks. These dredges are equipped with accommodations for 18 men, shower bath, galley and mess room. The weight of the draft of a steel hull is claimed to be one half that of a wood hull.

## C. E. Plummer Joins Chicago Engineering Firm

The Robert W. Hunt Company, Engineers, of Chicago, have appointed C. E. Plummer to the position of Chief Chemical and Metallurgical Engineer. His headquarters will be in the general office, 2200 Insurance Exchange Building.

Mr. Plummer is a graduate of the University of Michigan in chemical engineering and received his Master's Degree in chemical and metallurgical engineering from the University of Minnesota. He has had a variety of experience in chemical and metallurgical engineering work in his past connections with various mining, smelting and copper companies, and has been connected with the Bureau of Mines, Bureau of Standards, and with the Union Carbide and Carbon Company in charge of research work.

## Scraper Deepens Channel Below Power House

The Northern States Power Company, a subsidiary of the Byllesby Engineering and Management Corporation, was confronted with a problem of deepening the channel below the newly constructed dam at the Chippewa Falls Hydro plant. The channel was about 200 feet wide at its widest point and was quite shallow, but it was necessary to keep it open in order to keep the plant running. In laying the foundation for the power house, it was necessary to construct a cofferdam across this part of the channel. This cofferdam was composed of sand, gravel and large boulders, all of which were secured from the river bed.

The problem of removing this temporary dam, below the water level, when it was no longer possible to use steam shovels confronted the engineers. This was necessary because of the Government order, "to keep the river open and to lower the point of discharge of the water turbines." In studying the problem they found they could continue with the steam shovels but this would bring the cost up to a prohibitive point as the plant must be shut down and the water diverted through the gates in the permanent dam.

One of the engineers suggested the use of a power scraper because of the possibility of using it efficiently under water. A Garst power plow scraper bucket was selected. This job has proved to be a most difficult test, as the estimated material to be moved, which was only about 30,000 yards, consisted of mixed silt, gravel and boulders ranging in size up to three or four yards. It was found necessary to use a two yard bucket especially reinforced because of the terrific hammering against these boulders both when full and empty. While no definite cost has been compiled on the scraper, Mr. Walters, one of the chief engineers of the Byllesby organization at the Minneapolis office, has stated that the method being used has resulted in economy. The great shock and strain to which the scraper is subjected in pulling its load over the rough bedrock and boulders may be easily imagined.

The Garst Manufacturing Company, of Chicago, manufacture a complete line of power drag scrapers ranging in size from ½ cubic yard up to and including 6 cubic yard units. In sizes of 2 cubic yard and more a Rolman forged manganese steel wearing plate is supplied with the scrapers.

## Drill Steel Shop Equipment Described

The Gilman Manufacturing Company of East Boston, Massachusetts, in a pamphlet now being distributed describes automatic drill steel shop equipment for mine, quarry and contract drilling. These include the CE21 automatic heat treating machine, the CB5 forging furnace, and a great variety of smaller tools and accessories.

## Vulcan Opens Branch Office

The Vulcan Iron Works of Wilkes Barre, Pennsylvania, has opened a branch office at 719 Hamilton Street, Allentown, Pennsylvania. The new office is in charge of Joseph V. Durkin, who was formerly assistant operating manager for the Coplay Cement Manufacturing Company.

**Rates for display advertisements in the Broadcast Section are given below. If you want to buy or sell used equipment, if you want a job or need a man, advertise your wants in Pit and Quarry. Advertisement copy for publication in the next issue should reach our office within one week after the date of this issue.**

| RATES PER INSERTION | 1 Inch | 2 Inches | 3 Inches | 4 Inches | 5 Inches | 6 Inches | 8 Inches | 9 Inches | 10 Inches | 12 Inches | 15 Inches | 20 Inches | 30 Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Insertion | $ 3.75 | $ 7.25 | $10.75 | $14.25 | $17.75 | $ 21.25 | $28.25 | $31.75 | $35.25 | $42.25 | $56.25 | $70.25 | $105.00 |
| 2 Insertions | 3.75 | 7.25 | 10.70 | 14.20 | 17.65 | 21.15 | 28.15 | 31.65 | 35.15 | 42.15 | 56.15 | 70.00 | 104.00 |
| 3 Insertions | 3.75 | 7.20 | 10.65 | 14.15 | 17.55 | 21.05 | 28.05 | 31.55 | 35.10 | 42.05 | 56.05 | 69.75 | 103.00 |
| 4 Insertions | 3.70 | 7.15 | 10.60 | 14.10 | 17.45 | 20.95 | 27.95 | 31.45 | 35.00 | 41.95 | 55.90 | 68.75 | 101.00 |
| 8 Insertions | 3.65 | 7.05 | 10.50 | 14.00 | 17.25 | 20.75 | 27.75 | 31.25 | 34.80 | 41.75 | 55.70 | 67.50 | 98.00 |
| 13 Insertions | 3.60 | 6.95 | 10.40 | 13.90 | 17.05 | 20.55 | 27.55 | 31.05 | 34.60 | 41.55 | 55.55 | 66.25 | 94.00 |
| 26 Insertions | 3.50 | 6.75 | 10.20 | 13.70 | 16.65 | 20.05 | 27.05 | 30.65 | 34.20 | 41.05 | 55.05 | 64.00 | 88.00 |

INFORMATION—"Broadcast" space is sold by the advertising "inch." Each page contains 30 inches. The width of the page is divided into 3 columns, each 2¼ inches wide. Each column contains 10 inches measured the length of the column. Any space may be used measured by the *even* inch in height (not fractions), by 1, 2 or 3 columns in width. The size of a space is its height in inches multiplied by the number of columns in width. Example: a space 3 inches high by 2 columns wide is 6 inches. Copy changes made without additional charge.

## It Pays to Advertise in PIT and QUARRY

The Southern Ohio Quarries Co. recently advertised for a primary crusher and belt conveyor.

Regarding the results received from their advertisement they write, *"We are pleased with the results received from the ad we ran in your paper. We will probably run another ad in a short time."*

## Complete Service Publishing Company

538 South Clark Street CHICAGO

## Machinery for Sale

**SPECIALS**
**1—4½'x16" Hardinge Steel Lined Mill**
**1—No. 6 Williams Universal Hammer Mill**

### CRUSHERS

**Crushing Rolls**

1—8"x5", 2—14"x20", 4—24"x12", 1—26"x15", 1—30"x10", 1—30"x16", 2—36"x16", 2—42"x16", 1—54"x24".

**Gyratory**

All sizes from No. 2 Reduction to No. 12K.

**Jaw**

One 4"x8"—two 7"x10"—one 6"x20"—two 9"x15"—one 10"x20"—two 12"x24"—one 18"x36"—one 24"x36"—one 42"x30".

**Rotary**

Two No. 0, two No. 1, one No. 1½, and one No. 2 Sturtevant Rotary Fine Crushers.

**Ring Roll**

One No. 1 and one No. 2 Duplex Sturtevant ring roll mills.

**Ball and Tube Mills**

3', 4', 4½', 5', 5½', 6', 8' Hardinge Mills and Tube Mills.

### DRYERS

One 3'x30', Three 4'x30', One 4½'x30', One 5'x40', One 5½'x40', One 6'x60', One 7'x60' and One 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30', Two 8'x80' Ruggles Coles type "A" and One 4'x20' Ruggles Coles type "B" Double Shell Rotary Dryers.

### KILNS

4'x40', 5'x60', 6'x60', 6'x70', 6'x90', 6'x100', 6'x120', 7'x80', 8'x125'.

### MILLS

Two 33" and two 42" Fuller Lehigh Mills.
1 No. 0000, 1 No. 00, 2 No. 1, 2—4 Roll, and 1—5 Roll Raymond.
Swing Hammer Mills, Griffin Mills, Attrition and Cage Mills.
Air separators, Screens, Elevators and Conveyors.

**The Heineken Engineering Corp.**
**Industrial Engineers**
117 Liberty St., New York City
**Courtlandt 5130**

## FOR SALE
## ROTARY KILNS

1—9x100 ft.
1—8x125 ft. Two Tire
1—8x125 ft. Four Tire
1—7x100 ft.
1—7-5½x60 ft.
1—6x70 ft.
3—4½x44 ft.
5—5x33 ft. Vacuum Dryers

### CRUSHERS—GYRATORY

1—No. 9-K Allis-Chalmers
No. 6 Kennedy
No. 6 McCully
No. 7½ McCully
No. 7½ Kennedy

**EQUIPMENT SALES COMPANY**
R. W. Storrs, Jr., Manager,
**Richmond Virginia**

### CRAWLER SHOVELS

1—MARION MODEL 37, Steam, Crawler, New 1927, 1¾ yd. Mang. Dipper, Boom 26 ft., Dipper handle 17½ ft. Overhauled. Like New.
1—ERIE B-2 DREADNAUGHT, Steam, Crawler; New 1927, 1-yd., HIGH LIFT, Overhauled. Excellent Condition.
1—KOEHRING, GASOLINE, New late 1926, 1-yd. HIGH LIFT, Overhauled, First-class condition.
1—OSGOOD HEAVY DUTY (1-yd.), GASOLINE, New 1927, HIGH LIFT. Also 40 ft. Crane Boom if desired, Excellent condition.

### CRANES

1—12-ton cap. NORTHWEST, Model No. 105, GASOLINE, Crawler Crane, New late 1926, 40 ft. Boom, Bucket Operating, Steel Cab, First-class condition.
2—25-ton, 8-wheel, INDUSTRIAL, Type G, Steam locomotive Cranes, New 1926, 50 ft. Booms, Bucket Operating, M. C. B., Excellent condition.

**GREY STEEL PRODUCTS CO.**
**111 Broadway New York, N. Y.**

## CENTRIFUGAL PUMPS

10—Allis Chalmers 10-inch suction and 10-inch discharge pumps, each dir. connected to 200 H. P. 3 ph. 60 cyc., 2200 v. motors, capacity each 3500 g. p. m. at 180 ft. head. Can be operated in tandem for higher heads.

## DREDGE PUMPS

2—Morris 8-inch steam drive.

## DRAGLINES

Class 24 Bucyrus 4-yd. capacity electric.
Class 14 Bucyrus 2-yd. capacity steam.

## DUMP CARS

4—Western 6-yd. cap. standard gauge.
10—Lakewood 1½-yd. cap. 24-in. gauge.

## GASOLINE LOCOMOTIVES

1 Plymouth 4-ton, 24-inch gauge.
1 Midwest 4-ton, 24-inch gauge.

## STONE SCREEN

1 Heavy Duty 3-ft. by 12-ft. Roller Type Screen with A. C. Motor Drive.

## WELL DRILL

2—Sanderson No. 14 Cyclone Well Drills, gasoline operated.
Send for List No. 8 of Pumps, Engines, Motors, Compressors, Rails, Sheet Piling, Hoists, Locomotives, Buckets, Bins, Cranes, etc.

**THE U. G. I. CONTRACTING COMPANY**
Attention: R. C. Stanhope, Jr., Supervisor of Equipment
112 N. Broad Street Philadelphia, Pa.

### GASOLINE SHOVELS AND CRANES

1—1¼ Yd. Lorain 75 Cat. Shovel.
1—Link Belt Combination Cat. 1 Yd. Shovel and 50' crane boom.
1—Model 105 Northwest Combination ¾ yd. shovel and 40' crane boom.
1—Byers Bearcat Cat. with 30' crane boom.

### GAS LOCOMOTIVES

1—12 ton Whitcomb standard gauge.
1— 7 ton Plymouth 36" gauge.

### HOSTING ENGINES

1—60 HP National 3 drum 3 phase, 60 cycle 220 volts with swinger.
1—22 HP Lambert DD 3 phase, 60 cycle, 220 volts.
1—8¼x10 Stroudsburg Triple Drum Hoist with swinger. Boiler mounted.

### DERRICKS

3—5 to 7 ton all-steel stiffleg derricks.
1—10 ton Wooden Stiffleg Derrick 80' boom.

### BOILERS

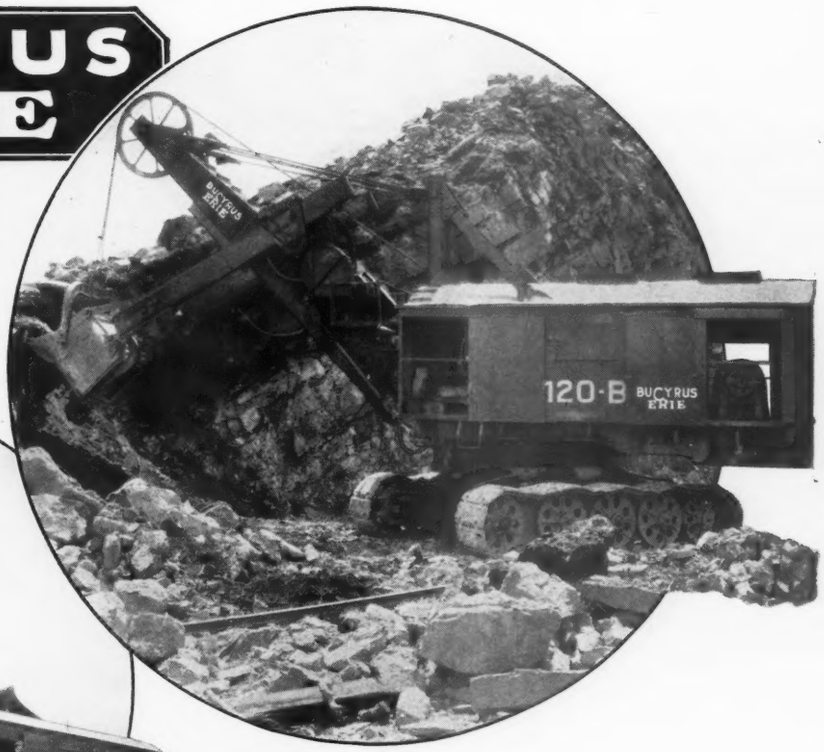
1—100 HP Locomotive Type, ASME.
1—125 HP Locomotive Type, ASME.

### DUMP CARS

6—4 yd. Western 36" gauge, steel beam and steel floors. Like new.

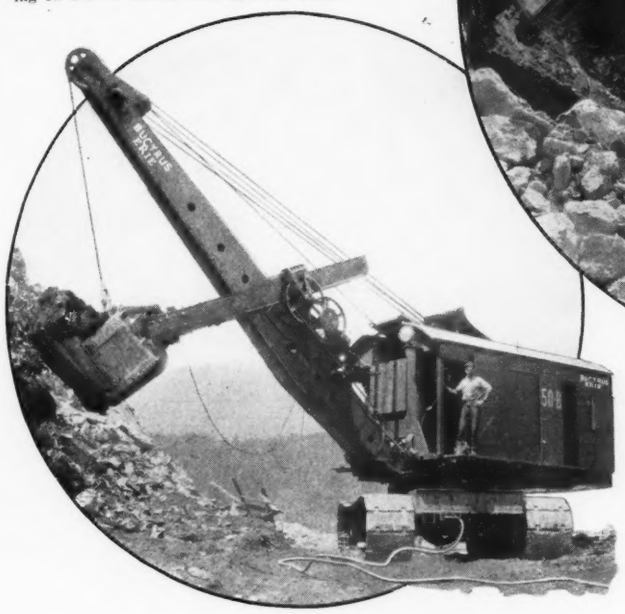
**B. M. WEISS**
**1324 Widener Bldg. Philadelphia, Pa.**

BUCYRUS ERIE




4-yd. BUCYRUS-ERIE 120-B Electric Shovel, which replaced two railroad type shovels in quarry of Superior Portland Cement Co. at Concrete, Wash. Has loaded as high as 2,352 tons in 8 hours.

2-yd. BUCYRUS-ERIE 50-B Electric, working on 210-ft. bench, casting rock down.



# Has cut the cost of loading rock from 275 ft. face

***Economies shown in quarry of Superior Portland Cement Co. at Concrete, Wash., with one shovel on floor and one on bench***

Even though you may never work a face of such unusual height as 275 ft., the long reach of the 4-yd. BUCYRUS-ERIE revolving shovel shows very important advantages as compared with the railroad type shovel.

In this quarry the larger revolving BUCYRUS-ERIE replaced two shovels of the older type, making a sharp cut in loading cost. And increasing safety, as it works farther from the face and can easily move back at night on its caterpillars.

The smaller shovel— the 50-B BUCYRUS-ERIE, with 2-yd. dipper— was used to cut down face height by working on a bench 210 ft. above the floor, casting the rock down.

ELECTRIC DRIVE adds further economies in this quarry, lower costs for labor and power. As H. A. Ambler, Supt. for the Superior Portland Cement Co. writes: "For our conditions electrical operation is preferable; much less labor is required. We have found BUCYRUS-ERIE shovels very reliable, with low maintenance costs."

The low upkeep cost and Reliability of the BUCYRUS-ERIE are due to the simplicity of design, which makes unequalled sturdiness possible.

Write us for reports in full detail, from quarries and pits where conditions are similar to your own— giving an idea of the results BUCYRUS-ERIES will produce for you.

**BUCYRUS-ERIE COMPANY**

Plants: South Milwaukee, Wis. - Erie, Pa. - Evansville, Ind.

General Sales Offices: South Milwaukee, Wis., Erie, Pa.

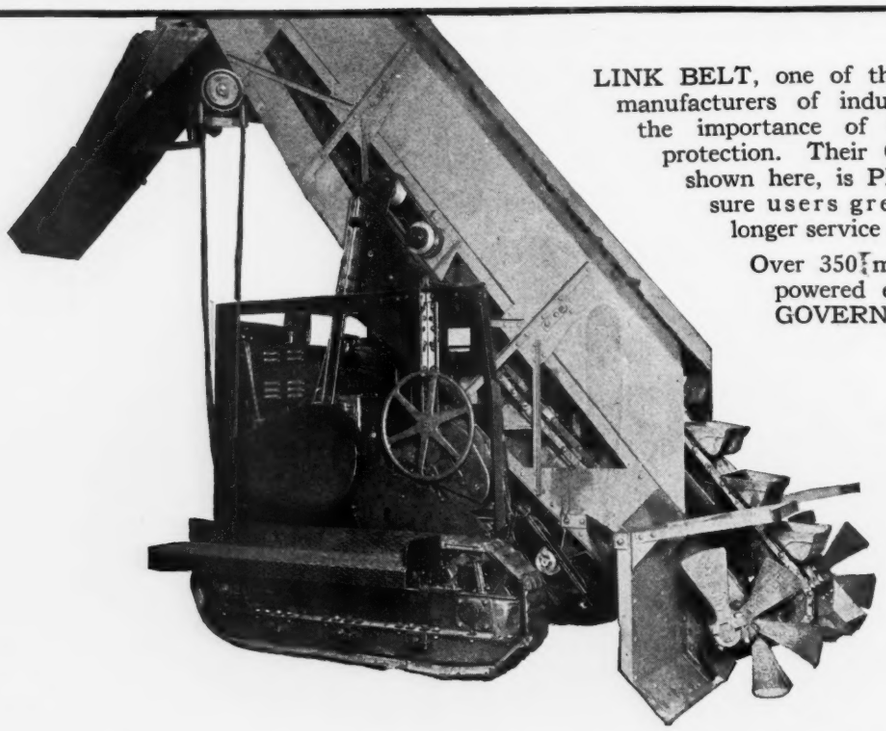
Branch Offices

| | | | |
|---|---|---|---|
| Boston | Atlanta | Buffalo | St. Louis |
| New York | Birmingham | Detroit | Dallas |
| Philadelphia | Pittsburgh | Chicago | San Francisco |

Representatives and Service throughout U. S. A. and Canada.

*Offices and agencies in all the principal countries throughout the world*

## *Ungoverned Power Destroys Even the Most Rugged Machine*



LINK BELT, one of the country's outstanding manufacturers of industrial equipment, know the importance of PIERCE GOVERNOR protection. Their Grizzly Crawler Loader, shown here, is PIERCE protected to assure users greater production and longer service at a lower cost.

Over 350 manufacturers of gasoline powered equipment use PIERCE GOVERNORS.

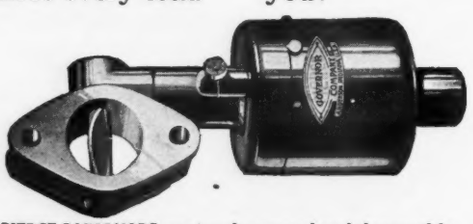
# Profitable Protection!

Protecting your power engines against the ravages of racing, stalling and vibration is the sure, easy road to bigger production, lower operating costs and greater profits!

PIERCE GOVERNORS on your power engines assure a smooth, uniform flow of power to meet every load — no matter how wide or sudden the variation. No stalling when the load is applied — no racing when it is released!

PIERCE GOVERNORS protect every moving part of your machines—keeping them out of the repair shop and on the job. They cut fuel and operating costs, save big repair bills, increase efficiency and prolong engine life 200% to 400%.

That's profitable protection for you!



PIERCE GOVERNORS are simple, rugged and thoroughly dependable. Will last a lifetime. Fully guaranteed.

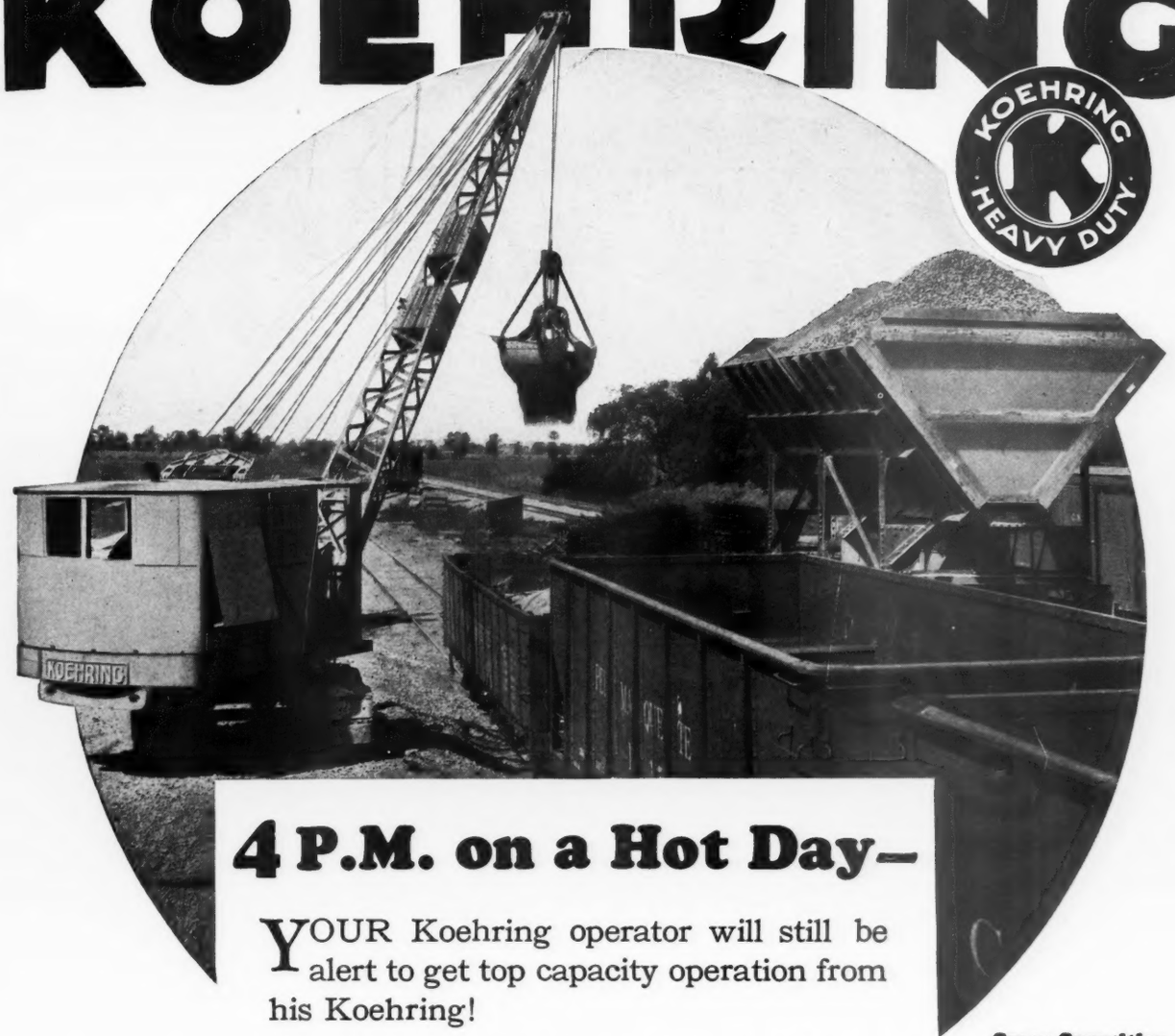
Let us show you in detail what PIERCE GOVERNORS have done for other operators —and what they will do for YOU. Send for booklet No. 55.

**THE PIERCE GOVERNOR COMPANY, Anderson, Indiana**

*World's Largest Governor Builders*

# Pierce Governors
## *for Automatic Speed Control*

# KOEHRING




## 4 P.M. on a Hot Day—

YOUR Koehring operator will still be alert to get top capacity operation from his Koehring!

Koehring FingerTip ease of control keeps him "on the job," interested and eager, and not worn to a "frazzle."

**Know the Koehring!**

It means high speed precision of operation—higher *earning capacity!*

Again we say — "Know the Koehring!"

Know what Koehring speed means to extra profits — what Koehring Heavy Duty construction means to long service-life.

And again we say "Know the Koehring."

***Write for Bulletin C. R. 32***

**Crane Capacities**

*Based on 66⅔% of Overturning Load*

Quickly convertible to shovel or dragline.

No. 301—10 Tons at 12' Radius. When used with clamshell bucket loaded with dry sand or gravel:

1 Yd. Bucket (weighing empty 3,450 lbs.) at 28' Radius, 40' Boom;
¾ Yd. Bucket (weighing empty 2,600 lbs.) at 34' Radius, 45' Boom;
½ Yd. Bucket (weighing empty 2,050 lbs.) at 41' Radius, 50' Boom.

Wisconsin four cylinder gasoline engine, 5¼" x 6½", 1,000 R. P. M.

No. 501—17 Tons at 12' Radius. When used with clamshell bucket loaded with dry sand or gravel:

1½ Yd. Bucket (weighing empty 4,800 lbs.) at 31' Radius, 45' Boom;
1¼ Yd. Bucket (weighing empty 3,950 lbs.) at 36' Radius, 45' Boom;
1 Yd. bucket (weighing empty 3,500 lbs.) at 41' Radius, 50' Boom;
¾ Yd. Bucket (weighing empty 2,800 lbs.) at 48' Radius, 55' Boom.

Wisconsin four cylinder gasoline engine, 6" x 7", 925 R. P. M.

A4583-I

KOEHRING COMPANY MILWAUKEE WISCONSIN

PAVERS, MIXERS--GASOLINE SHOVELS, CRANES AND DRAGLINES

*Sales Offices and Service Warehouses in all principal cities*

*Foreign Dept.*, Room 579, 50 Church St., New York City.

*Mexico*, F. S. Lapum, Cinco De Mayo 21, Mexico, D. F.

# This Cableway

has been in hard service for over two years and still in perfect condition.

# WILLIAMSPORT

## TRAMWAYS and CABLEWAYS

are built for long enduring service.

You may have a problem which can be solved through the use of this

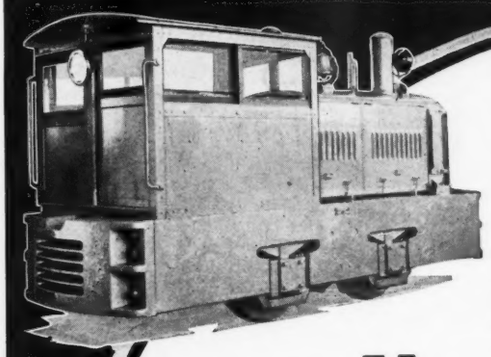
## ECONOMICAL TRANSPORTATION

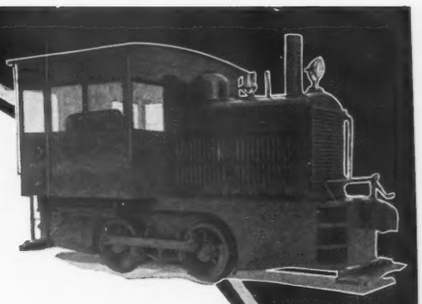
Our engineering department is at your service.

## WILLIAMSPORT WIRE ROPE CO.

Main Office and Works: WILLIAMSPORT, PENN. General Sales Offices: 122 South Michigan Avenue

Chicago



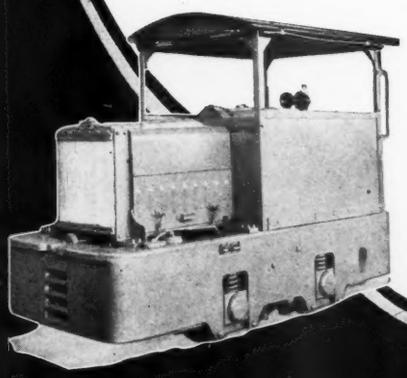


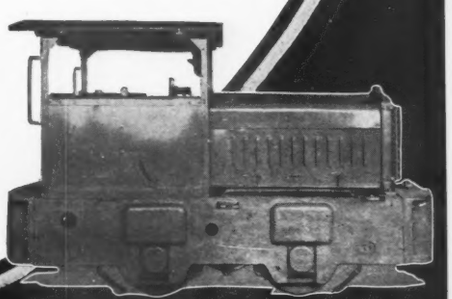
# Built for Years of Service

DURING the life of an industrial locomotive there come many occasions to test its stamina. To build a locomotive so sturdy and reliable as to meet without flinching all such trials is a constant aim in the design and manufacture of Whitcomb Locomotives.

The long average life of Whitcomb Gasoline Locomotives may be attributed to their ruggedness and to the careful manufacturing methods that characterize their production. The Whitcomb *frame*, for instance, is exceptionally heavy. The design of the locomove is such that all stress and pull is carried by this super-strong frame—with no strain upon any part of the driving mechanism.

The advantages of Whitcomb construction are thoroughly apparent when one looks into the records established by these machines. On hundreds of operations similar to your own, "Whitcombs" have distinguished themselves by dependable, low-cost operation and long-term service.





*Made in all sizes from 2½ to 50 tons —for all track gauges. Gasoline or Electric Powered.*

**GEO. D. WHITCOMB COMPANY**

**Plant at Rochelle, Illinois**

*Offices in Principal Cities*

**WHITCOMB LOCOMOTIVES**

**GASOLINE ELECTRIC**

# *Losses from* Breakdowns Never Worry *the Owner of a* TELSMITH *Crusher*

BREAKDOWNS generally occur at the most inopportune times — just when continuous production is all important. The inconvenience is bad enough, but it's the cost that hurts. Payroll and overhead go on just the same and repairs run into money. That's the hazard which continually threatens the owner of an iron lever-shaft crusher.

But to the Telsmith owner, a breakdown is only a remote contingency. Compact and massive in design—90% *steel* construction —with unbreakable pillar-shaft—Telsmith has the sheer brute strength that enables it to *stand the gaff*, where another crusher would break. Stronger still is *Telsmith's Two-Year Guarantee* of frame, crown and shaft *against breakage even by tramp iron*, the most unique warranty in crusher history.

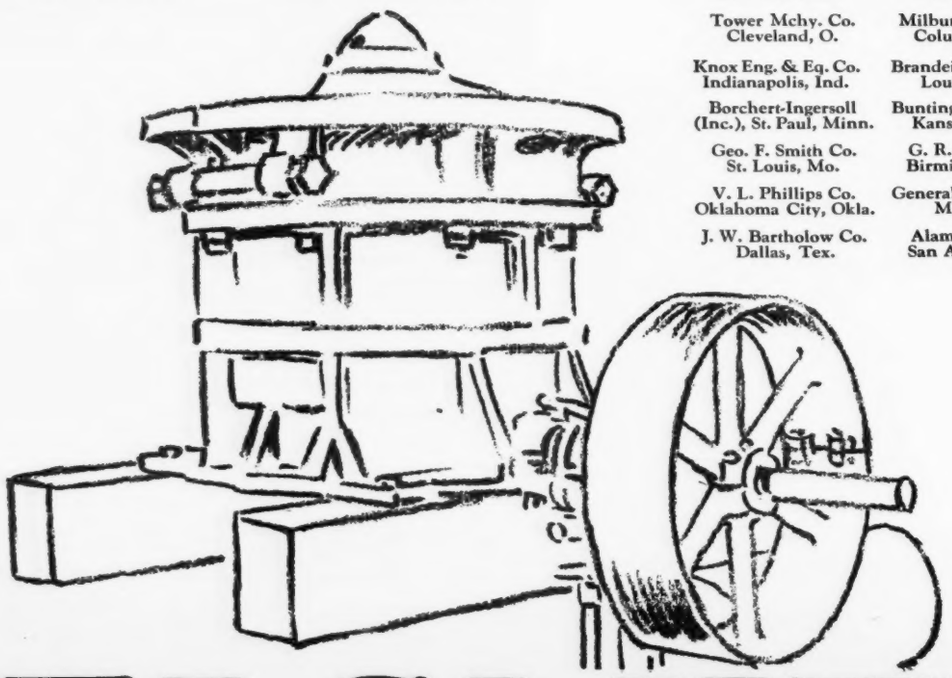
*For Telsmith's complete story, write for Catalog 161 (Telsmith Primary Breaker) and Bulletin 2F15 (Telsmith Reduction Crusher). No charge or obligation.*

SMITH ENGINEERING WORKS
88 CAPITOL DRIVE MILWAUKEE, WIS.

*Consult the nearest Representative or write or wire TELSMITH direct.*

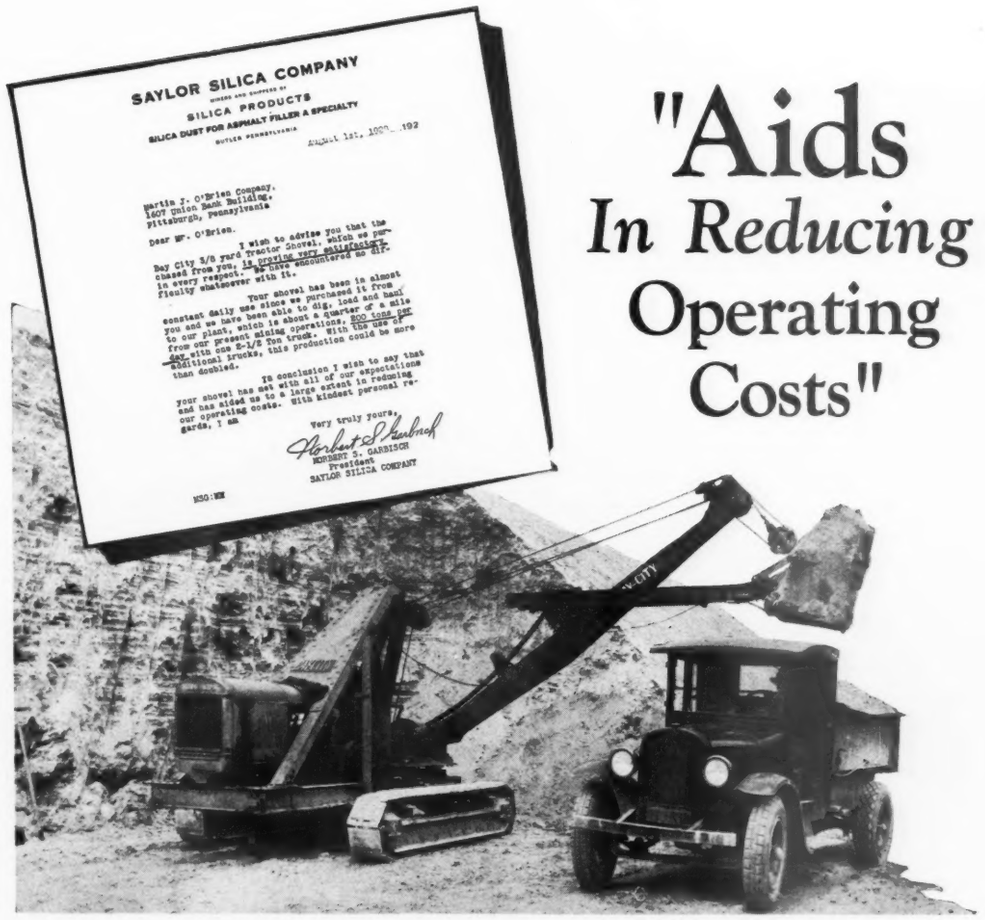
CANADIAN REPRESENTATIVES:
Canadian Ingersoll-Rand Co., Montreal, P. Q.

| | |
|---|---|
| 11 West 42nd St. New York City | 716 Builders' Bldg. Chicago, Ill. |
| Harrison Bldg. Philadelphia, Pa. | The K. B. Noble Co. Hartford, Conn. |
| Maryland Eq. & S. Co. Baltimore, Md. | Beckwith Mchy. Co. Pittsburgh, Pa. |
| Tower Mchy. Co. Cleveland, O. | Milburn Mchy. Co. Columbus, Ohio |
| Knox Eng. & Eq. Co. Indianapolis, Ind. | Brandeis M. & S. Co. Louisville, Ky. |
| Borchert-Ingersoll (Inc.), St. Paul, Minn. | Bunting H. & M. Co. Kansas City, Mo. |
| Geo. F. Smith Co. St. Louis, Mo. | G. R. Mueller Co. Birmingham, Ala. |
| V. L. Phillips Co. Oklahoma City, Okla. | General E. & M. Co. Miami, Fla. |
| J. W. Bartholow Co. Dallas, Tex. | Alamo Iron Wks. San Antonio, Tex. |



B-3

# TELSMITH


SAYLOR SILICA COMPANY
SILICA PRODUCTS
SILICA DUST FOR ASPHALT FILLER A SPECIALTY
Martin J. O'Brien Company,
1607 Union Bank Building,
Pittsburgh, Pennsylvania
Dear Mr. O'Brien.
I wish to advise you that the Bay City 3/8 yard Tractor Shovel, which we purchased from you, is proving very satisfactory in every respect. We have encountered no difficulty whatsoever with it.
Your shovel has been in almost constant daily use since we purchased it from you and we have been able to dig, load and haul to our plant, which is about a quarter of a mile from our present mining operations, 200 tons per day with one 5-1/2 Ton truck. With the use of additional trucks, this production could be more than doubled.
In conclusion I wish to say that your shovel has met with all of our expectations and has aided us to a large extent in reducing our operating costs. With kindest personal regards, I am
Very truly yours,
Herbert S. Garbisch
HERBERT S. GARBISCH
President
SAYLOR SILICA COMPANY
HSG:HH

# "Aids In Reducing Operating Costs"

# *That's what every* BAY CITY *is built to do—Mr. Garbisch*

IT'S not at all surprising that your ⅜-yard Bay City "is proving very satisfactory:" that you "are able to dig, load, and haul 200 tons per day and could easily double this production."

Frankly, Mr. Garbisch, if Bay City did not do these things we would take back the shovel and refund your money. And that's something we have never had to do nor ever expect to have to do.

From the photograph Mr. Garbisch sent us, several interesting points about the Bay City are illustrated. Note the teeth marks on the Silica up to a height of 20 feet. Note too how the heaping oversize ½-yard load is being balanced at right angles. Here are some of the reasons for Bay City performance: Timken Bearings—Big Full crawlers—Limitless power—McCormick Deering Units—42-degree hill climbing ability—Convertible—One man operated. There are many other features which we should like to explain to you. Why not drop us a line today?

# BAY CITY DREDGE WORKS

## BAY CITY, MICHIGAN

# The Simplest and Most Compact Shovel-Crane — And All Steel, Too

The simplicity of design and the outstanding excellence of material and workmanship which characterize the "AMERICAN GOPHER" Shovel-Crane have drawn favorable comment from experienced shovel men wherever the machine has been shown.

The "AMERICAN GOPHER" Shovel-Crane is notable for the absence of what one road contractor called "excess junk on the machinery deck." Its outstanding simplicity and ruggedness make it the logical machine to use on all jobs far from repair facilities.

Gasoline or Diesel. Convertible to crane or dragline. Lowest priced high grade machine of equal capacity.

*Write for catalog.*

**American Hoist and Derrick Co.**

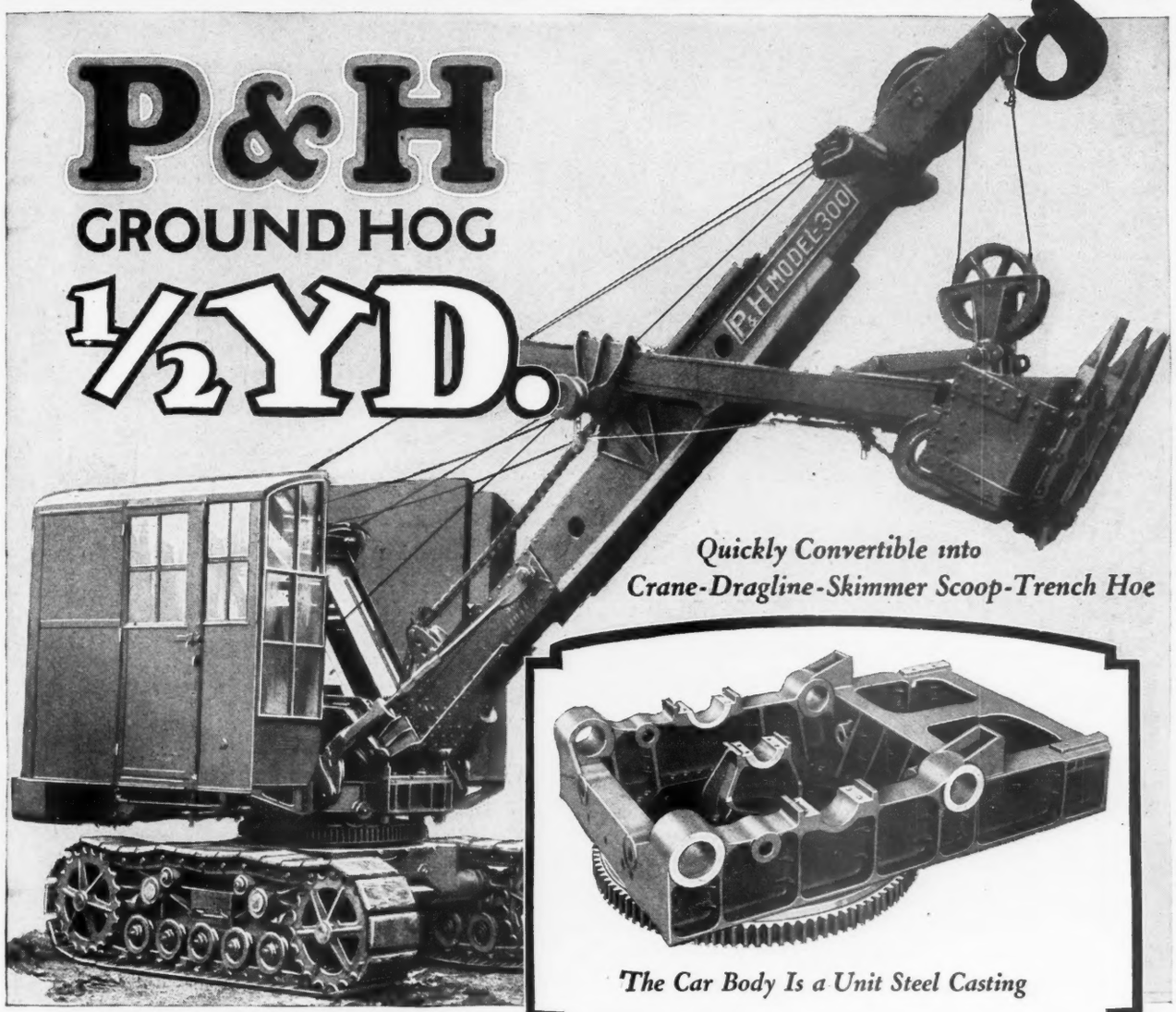
**St. Paul, Minn.**

**New York Chicago Pittsburgh St. Louis New Orleans**

"AMERICAN GOPHER" Shovel-Crane

# MAIN FRAMES *are* Unit Steel Castings

## P&H GROUND HOG ½ YD.




*Quickly Convertible into Crane-Dragline-Skimmer Scoop-Trench Hoe*



*The Car Body Is a Unit Steel Casting*

*Model 300—½ Yard*

HERE is a ½-yard machine in which all main frames are massive Unit Steel Castings — fully machined at every joint and bearing point. All wearing parts *stay permanently in alignment;* greatly increasing their life.

Gears, shafts and bearings may eventually require replacement but these huge main castings will never wear out. Other features you get in Groundhog Model 300 are the Powerful Independent Chain Crowd; Steering in any Radius by Steering Brakes; 50 h. p. Motor and Power Clutch Control. It's Full Revolving, of course.

*The Groundhog Bulletin gives complete specifications.*

**HARNISCHFEGER CORPORATION**

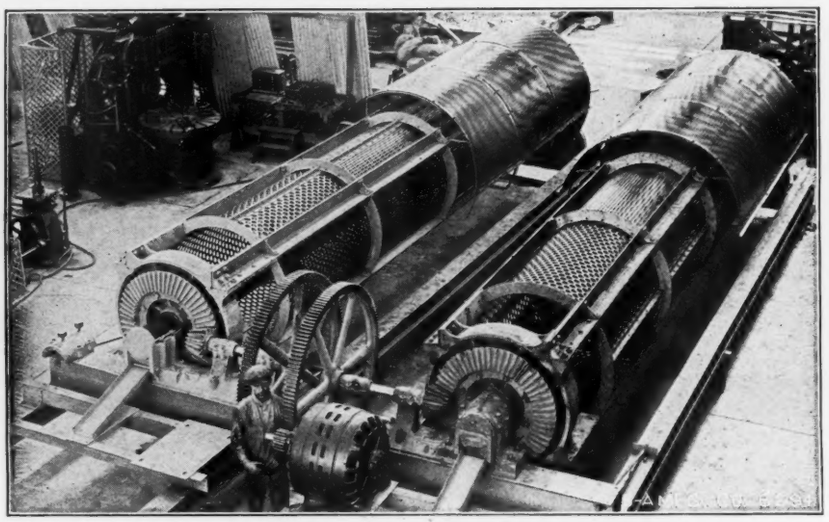
Established in 1884

3851 National Avenue, Milwaukee, Wis.

*Seattle, Minneapolis, New York, Jacksonville, Kansas City, Atlanta, Indianapolis, Birmingham, Charlotte, Pittsburgh, Portland, Boston, Dallas, St. Louis, Des Moines, San Francisco, Los Angeles, Cleveland, Philadelphia, Chicago, Detroit, Baltimore, Memphis*

WAREHOUSES AND SERVICE STATIONS: *Philadelphia, Memphis, Jacksonville, San Francisco, Los Angeles, Seattle*

# SCREENS



Two of a set of four 48-inch diameter by 24 feet long S-A screens in the service of the Santa Catalina Island Co.

Every screen should be specified by an expert Engineer who is familiar with the conditions of operation. Proper design and rugged construction must be part of every separation equipment to assure the proper operation. When it comes to the designing and building of revolving screens, S-A Engineers are ready to handle the job.

***S-A Engineers design and build all classes of screens—rotating, shaking, reciprocating, gravity and vibrating***

## Stephens-Adamson Mfg. Co., Aurora, Illinois

***Manufacturers of feeders, bucket elevators, pan and belt conveyors. Designers of complete installations for washing, screening and crushing plants for stone and gravel***

FACTORIES AT:

Aurora, Illinois  Los Angles, Calif.  Belleville, Ont., Canada

***Branch Engineering Offices in all Principal Cities***

STEPHENS-ADAMSON

S-A BELT CONVEYORS

Look at the tooth marks in this clay bank for evidence of the efficiency of the ORTON positive crowding device.

The whole crowding mechanism is built into the boom, *and is entirely independent of the hoisting mechanism.* Note the absence of ropes and chains.

# *Positive Crowding Action*

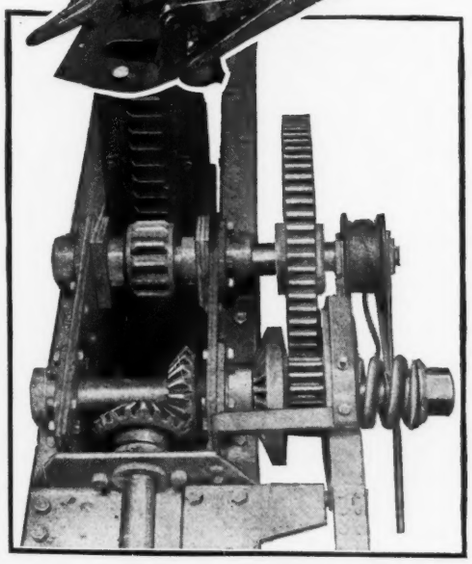
Ask the operator of any ORTON gasoline shovel why he is able to dig so fast and to move so much yardage.

He will tell you that speed comes from the crowding action. Full power of the engine is transmitted directly to the digging edge of the dipper by a patented gear-driven mechanism.

The hardest kind of digging can be done without stalling the engine or injuring the machine because the patented adjustable slip friction absorbs all stoppages of the dipper.

Crowding is controlled by *separate friction clutches* which are especially designed for the hard work done while crowding out the dipper, holding a grade, and shaking the dipper.

This positive crowding action is an exclusive feature of ORTON shovels that speeds up production beyond all comparison. A single demonstration will convince you.



All shocks and jars to the dipper are absorbed by the ORTON Patented Slip Friction, which is adjustable by the nut and spring shown in the illustration above

ORTON CRANE & SHOVEL CO.
608 S. Dearborn St., Chicago, Ill.
*Representatives in Principal Cities*

**ORTON**
***Cranes, Shovels & Buckets***

# What Is The Greatest Explosives Value Offered Today And Why?

THE buyer of explosives should know the answer to the above question. If he is to keep his costs on a level with his competitors', he must keep up with new developments in explosives that reduce the cost of blasting.

The greatest explosives value offered today is in the Hercomites 2 to 7. They sometimes save as much as 30% compared with previous blasting costs. The reason is that they have the lowest cost per cartridge of any explosives on the market, and that they will often replace Gelatin Extras and Extra L. F. Dynamites of from 20% to 50% strength, cartridge for cartridge. The table shows the grade of Hercomite to replace the various strengths of the older types of explosives.

| | |
|---|---|
| HERCOMITE 2 is nearest grade to | 60% Extra L. F. or 40% to 50% Gelatins |
| HERCOMITE 3 is nearest grade to | 50% Extra L. F. or 30% to 35% Gelatins |
| HERCOMITE 4 is nearest grade to | 40% Extra L. F. or 25% to 30% Gelatins |
| HERCOMITE 5 is nearest grade to | 30% Extra L. F. |
| HERCOMITE 6 is nearest grade to | 25% Extra L. F. |
| HERCOMITE 7 is nearest grade to | 20% Extra L. F. |

The Hercomites are among the safest commercial explosives known to industry.

*For information on other explosives and blasting supplies, see pages 78 and 79 of the 1928 Pit and Quarry Handbook.*

*Write for descriptive booklet.*

## HERCULES POWDER COMPANY
(INCORPORATED)

*Sales Offices:* Allentown, Pa., Birmingham, Buffalo, Chattanooga, Chicago, Denver, Duluth, Hazleton, Pa., Huntington, W. Va., Joplin, Mo., Los Angeles, Louisville, New York City, Norristown, Pa., Pittsburg, Kan., Pittsburgh, Pottsville, Pa., St. Louis, Salt Lake City, San Francisco, Wilkes-Barre, Wilmington, Del.

Hercules Powder Company, Inc.
960 King Street, Wilmington, Delaware

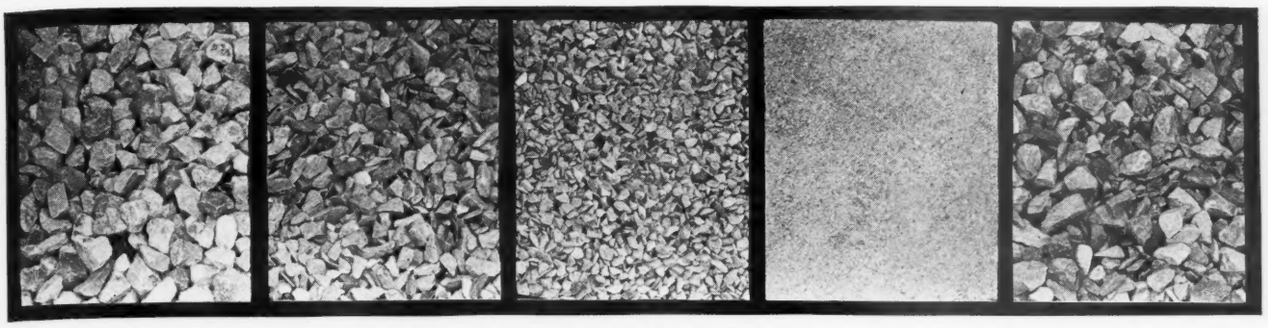
Please send me additional information regarding the new Hercomites, No. 2 to No. 7.

Name _____

Company _____

Street _____ City _____ State _____

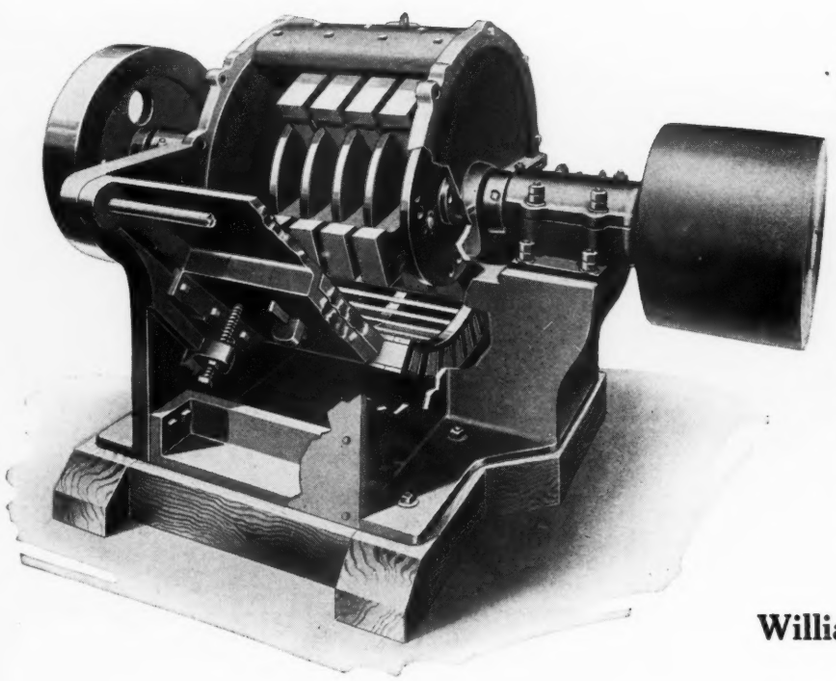
2280



1¼" Macadam | ¾" Concrete Stone | ½" Asphalt Binder | Agricultural Limestone | 1¼" Traffic Bound Macadam

# You can make them all with the "Jumbo Junior" Crusher

## Handles "Rejects" or "One Man" Size Stone



Today's demand is for smaller size stone and progressive quarrymen everywhere are equipping to supply this demand. In St. Louis alone four well known quarries have recently installed Jumbo Junior type crushers, not to mention many similar installations in other sections.

This popular Williams Hammer Crusher takes rejects or one man size rock and reduces to 1¼ in., ¾ in., or even agstone, if so adjusted. Can be regulated to produce clean rock with an unusually small percentage of fines. Also adjustable to make traffic bound macadam with the proper percentage of fines for filling the voids and for efficient binding.

Six sizes. Capacities 10 to 75 tons per hour. Why not investigate this money maker? The small outlay required will surprise you.

**Williams Patent Crusher & Pulverizer Co.**

**802 St. Louis Ave., St. Louis, Mo.**

Chicago
37 W. Van Buren St.

New York
15 Park Row

San Francisco
415 Fifth St.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS U.S.A. TRADE MARK

REG. U.S. PAT. OFF.

ORIGINAL PATENTEES AND WORLD'S LARGEST BUILDERS OF HAMMERMILLS

PATENT CRUSHERS GRINDERS SHREDDERS

# This New Selector Guarantees any Specified Fineness

***Six unique improvements in slow speed air separation that guarantee uniform output at specified fineness***

## Accept this Proposal

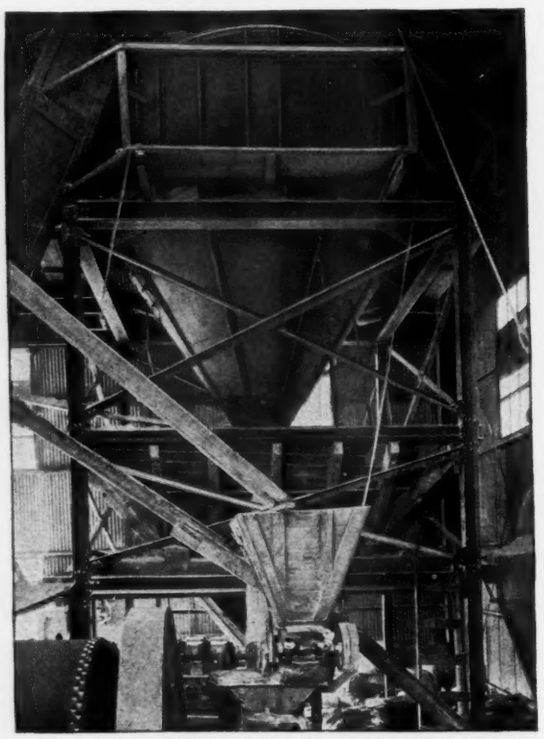
NEW discoveries in slow speed air separation simplify the problem of final product analysis amazingly. Through six remarkable improvements in the Sturtevant Air Selector, plants now have the means to supply a product of uniform fineness to customers whatever their specifications (within range of air separation).

According to actual performance in nearly 300 plants, this new Air Selector is the most efficient and reliable machine yet perfected for Lime, Talc, Clay, Cement, Chemicals, ground iron ore, soap and nearly 280 other materials and products.

Six Sturtevant Air Selector Units are installed at the Boettcher plant of Colorado Portland Cement Co., known as the world's most up-to-date dry-process cement plant.

Twelve Sturetvant Air Selector Units are operated by a nationally known firm for the separation of tobacco products. (Name on request.)

A Graphophone Co. uses three Sturetvant Air Selector Units in the preparation of material for its non-scratching phonograph records, a most exacting specification. (Name on request.)



**Sturtevant Air Selector sizing silica sand to 140 mesh at Pioneer Silica Products Co., Pacific, Mo.**

In nearly 300 other plants where fine separation from 50 to 350 mesh is essential — in plants whose sales problem necessitates absolute uniformity of product to the specified fineness, this Air Selector Unit is changing all previous conceptions of sizing; is proving its value over screens for fine products.

### *Six Great Advances*

Through six great improvements designed by Thos. J. Sturtevant, long known for his work in this field, the Sturtevant Air Selector reduces complaints about fineness; from "kicks" regarding product uniformity and analysis. It enables you to supply uniform fineness to your customers — and to fulfill specifications without added production costs. That is a powerful sales advantage in a competitive market. These six advances are fully described in engineering data we shall send you.

### *Accept This Proposal*

To determine accurately what the Air Selector Unit will do on your material; to show how much you can improve the analysis of your product and cut screening costs and difficulties, accept our Laboratory Test Report, as follows:

Without charge to you we will test a sample of your material. And tell you what the improved Air Selector will do, at what cost for the capacity wanted. This proposal enables you to learn before you spend what can be done. It enables you to put definite facts before your associates. And there is no charge for the Laboratory Report.

Send complete information about your material, the product wanted, fineness, output desired, and present methods. We will then promptly forward definite engineering data, and arrangements for laboratory Test. Write.

### *Accept These New Booklets*

For executives we are preparing a desk library of booklet-editorials. These editorials deal with cost-cutting, with product improvement, with scientific buying, with perplexing problems of management. They show what the ablest brains in industry do to solve these problems.

Four of these booklet-editorials are now available. These four, and the remaining of the first series of 12 will be sent with our compliments. Please use the coupon for your request, so that we can handle it promptly.

# STURTEVANT MILL CO.

***Harrison Sq., Boston, Mass.***

## USE FOR COMPLETE ENGINEERING DATA

**STURTEVANT MILL CO., 73 Harrison Square, Boston, Mass.**

Kindly forward literature upon your Air Selector Unit. ☐

Send copies of Booklet editorials 1 and 2. ☐

Name..... Firm .....

Address.....

# THE GUIDE TO LOWER HOISTING COSTS

# One Minute An Envelope And a Stamp

## *—virtually take you to 34 typical hoisting jobs*

The Novo Hoisting Handbook was written especially for contractors who want to get everything possible out of their hoisting units.

It is full of interesting pictures, facts and information on practically every type of hoisting work. This data is a compilation of hundreds of jobs in every section of the country. Thirty-four typical hoisting jobs are shown.

Fill out and send the coupon today—it takes only a minute, an envelope and a stamp. You'll find it a worthwhile investment. And no obligation.

NOVO ENGINE COMPANY, 262 Porter Street, Lansing, Mich.

CLARENCE E. BEMENT, Vice-Pres. & Gen. Mgr. Service, parts and sales in over 60 cities

NOVO ENGINE CO.,
262 Porter Street, Lansing, Mich.

Without obligating me in any way, please send a copy of the *Novo Hoisting Handbook.*

Name .....

Address .....

City .....

State .....

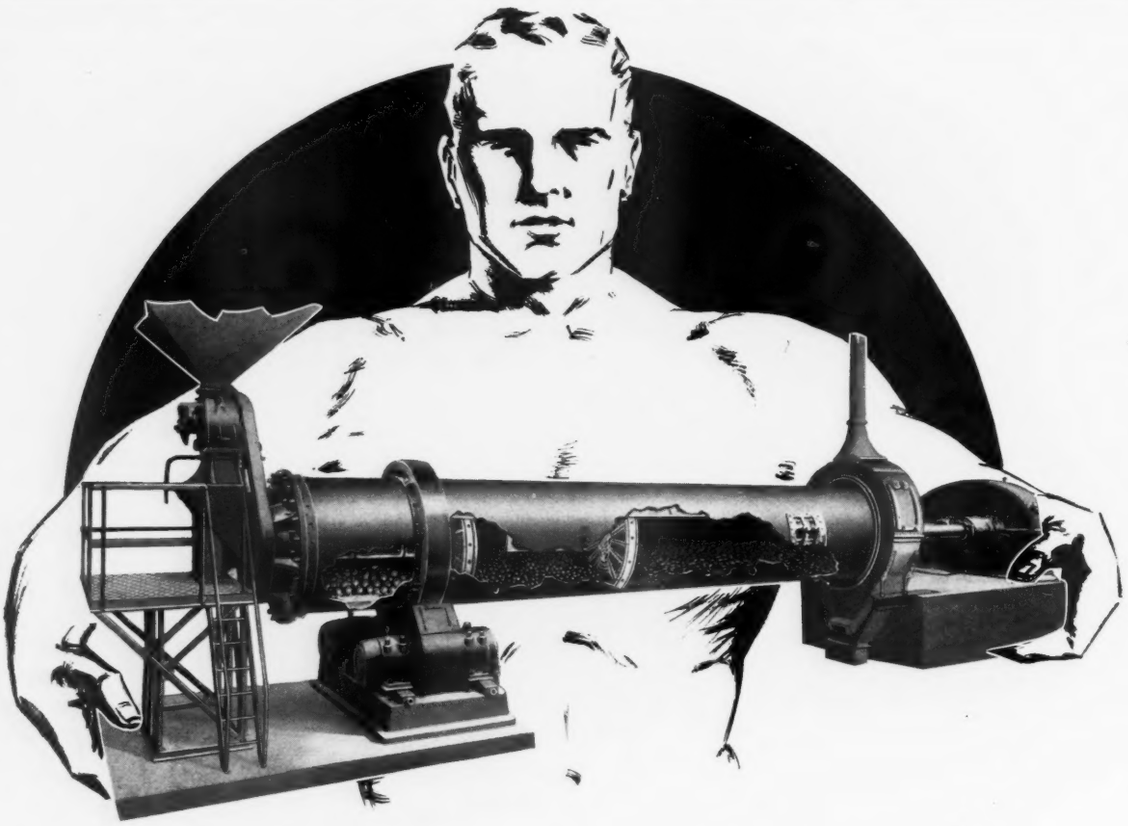
I am interested in a hoist for .....

# NOVO

Hoists from 300 to 10,000 Pounds

Also Engines and Pumps

THERE IS A VULCAN MILL TO MEET EVERY REQUIREMENT

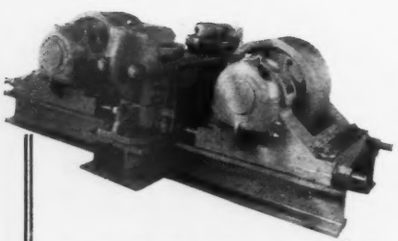


# Check these Advantages

A MULTIPLE Compartment Mill built-to-order for your particular requirements—that is in effect what you get in a Vulcan.

For every Vulcan Multiple Compartment Mill is modified to best meet the user's individual needs. For instance the mills may be supported on two trunnions; two tires or on one tire and one trunnion. The type of suspension being determined by either the size of the mill or the user's preference. Similarly other construction details are subject to modification so that when the mill is delivered it is truly built-to-order for your needs.

Even after a Vulcan leaves our factory and is installed in your plant, modifications in the lengths of the various compartments can easily be made. The Vulcan partitions are adjustable. This is a most important advantage for while the partitions are set at very nearly the correct position at the factory actual tests in the users plant may show some variation desirable. In these days when quality and fineness in a product counts more heavily than ever before—this advantage is a most real one.



**Single Roller Bearings for Rotary Kilns**

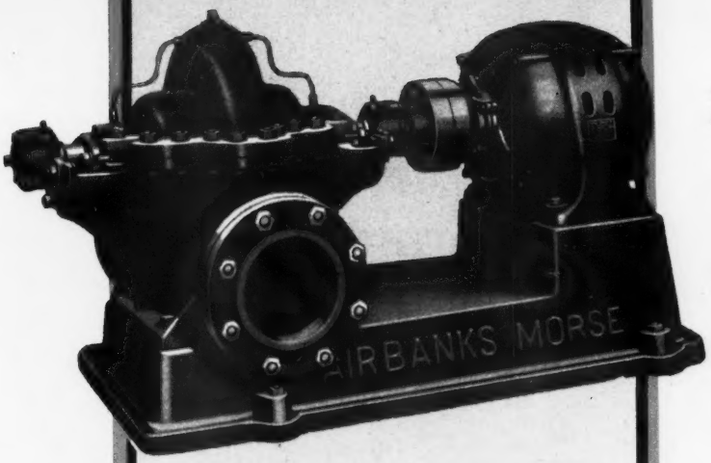
The finest that modern engineering Science can produce, these Vulcan single roller bearings insure dependable and economical rotary Kiln performance.

The finest materials—bearings are of phosphor bronze—rollers and tires of a special high carbon steel specially treated; the best design—self lubricating—dust and oil proof bearings; and the most careful workmanship go into the manufacture of Vulcan single roller bearings for rotary Kilns. These single roller bearings are typical of the high engineering standards maintained by Vulcan. When you are ready for your next Kiln—be sure to investigate Vulcan.

VULCAN of WILKES-BARRE

COMPARTMENT MILLS

NEW YORK OFFICE: *50 Church St.* CHICAGO OFFICE: *McCormick Bldg.*
ALLENTOWN, PA.




*This moderate head, matched pumping unit is ready for service on arrival.*

# MATCHED!

## ···PUMP UNITS

Designed to work together! Pump and motor on the same base—aligned and coupled at the factory—moving parts statically and dynamically balanced to work without vibration or wear on journals.

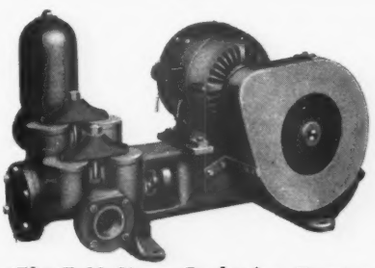
And ball bearings! Both pumps and motors equipped with power-saving, trouble-free bearings which require lubrication but once a year.

A complete range of types and sizes to meet most mining requirements.

FAIRBANKS, MORSE & CO.
Chicago

*28 branches at your service throughout the United States*

*F-M Matched Unit for heads up to 230 feet*



*The F-M Mine Gathering Pump—entirely self-oiling. Fill the reservoir at long intervals only*

*General Service or Boiler-Feed Steam Pump—typical of a large line of steam pumps*

**Fairbanks Type "S" Track Scales**

*Suspended bearings. Parts return to normal position by gravity after disturbance due to loading. The last word in track scale accuracy. Full information on request*

# FAIRBANKS-MORSE PUMPS

FAIRBANKS-MORSE *Pumps*

FAIRBANKS-MORSE MOTORS

# BUILT TO RENDER SERVICE NOT TO SELL AT A PRICE...

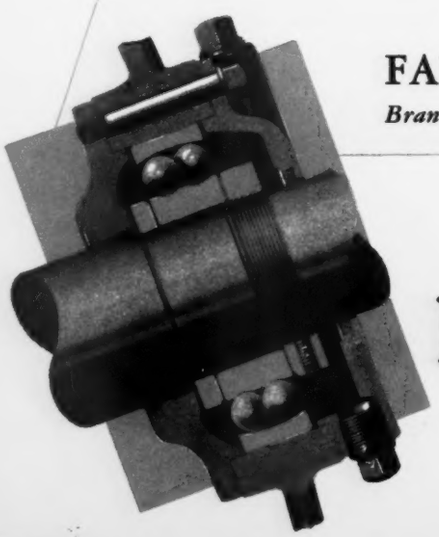
There is a point of diminishing returns in motor building economies. It is the point where the purchaser's dollar begins to grow smaller in its ability to purchase dependable service.

The Fairbanks-Morse Motor sells for the lowest possible price consistent with its quality—but Fairbanks-Morse economies of production stop at the point of diminishing returns to the buyer.

Thus the buyer of this motor receives most in service and the Fairbanks-Morse Motor becomes most economical for the user over a period of years.

FAIRBANKS, MORSE & CO., *Chicago*

*Branches and Service Stations Covering Every State in the Union*



# FAIRBANKS-MORSE MOTORS

AEPSA05.1

# NACO
## handles it faster, easier and *cheaper.*

NACO Cast Steel Shovel Chain will show a material saving in cost, per ton, of digging and handling mine or rock products.

NACO Shovel Chain is made of Naco Steel, having an elastic limit of about three times that of ordinary steel. This practically eliminates the troubles due to chain stretch so common in forged chain.

NACO links are absolutely uniform in size and shape, and are cast in one solid piece *free from welds.* This produces a stronger, smoother running chain, which results in easier handling and speeding up shovel operations.

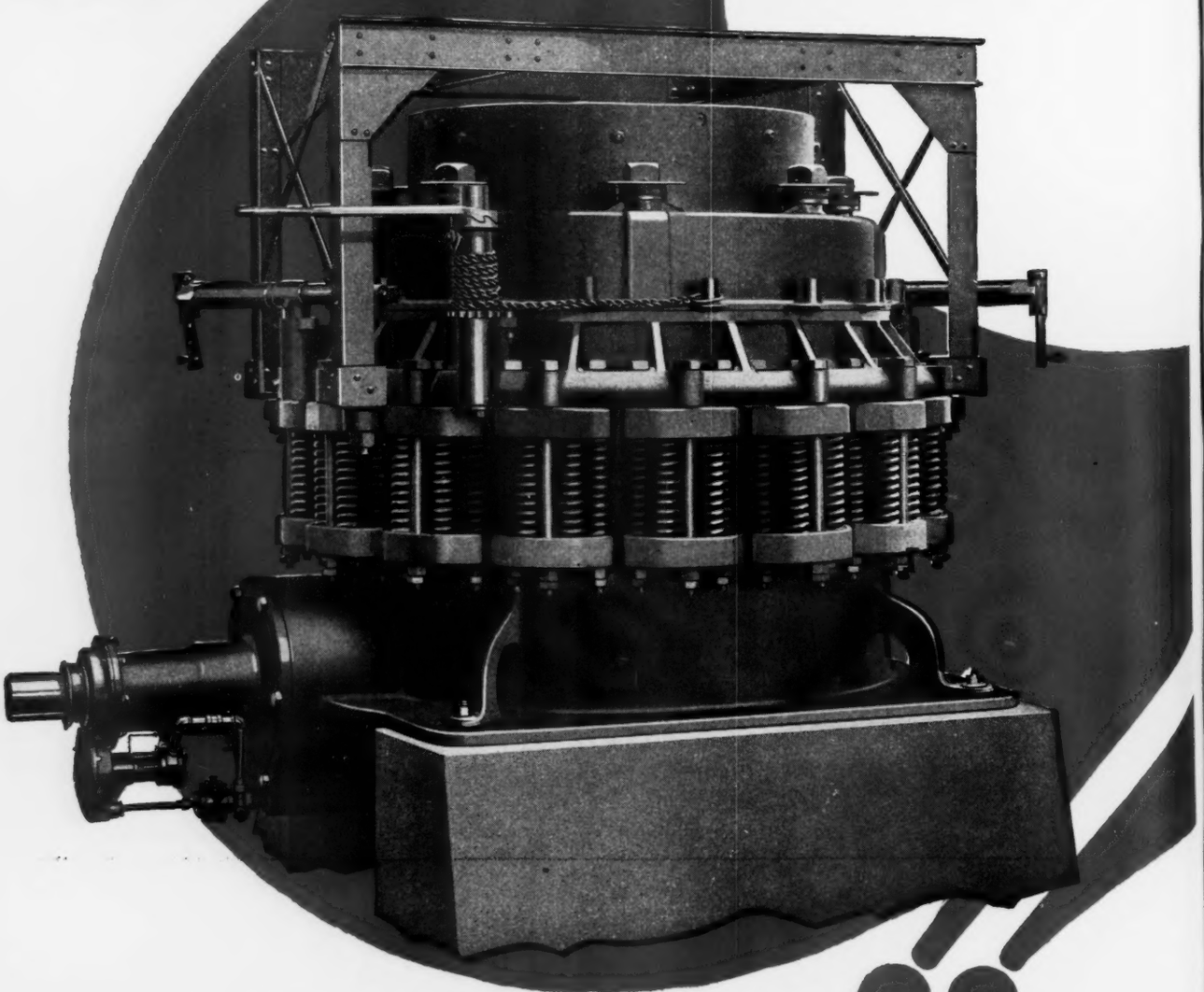
*Write for further information.*

**We also manufacture Naco Steel mine car Wheels and Hitchings**

**NATIONAL MALLEABLE AND STEEL CASTINGS CO.**
*General Office* — Cleveland, O.

**NACO** TRADE MARK **CAST STEEL CHAIN**
**The Strongest Chain Made**

# SYMONS CONE CRUSHERS

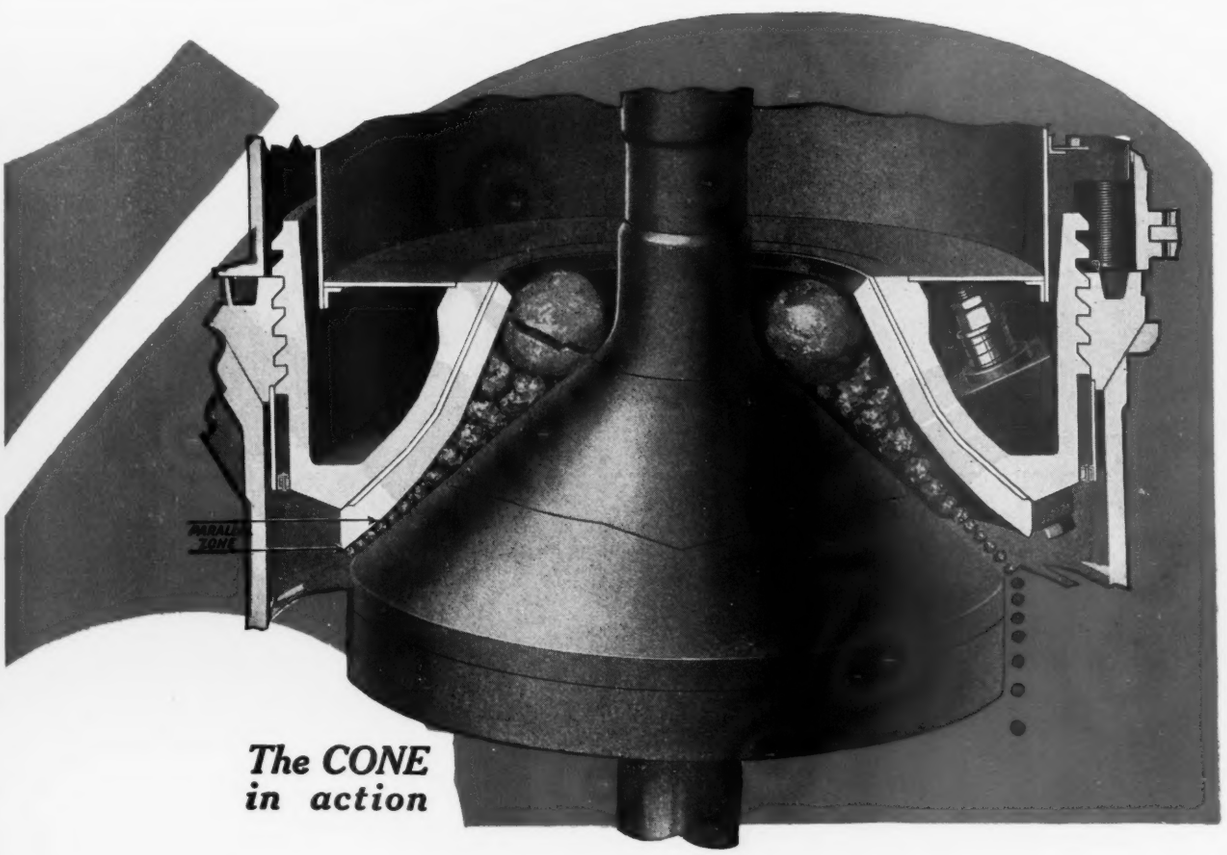


IN 5 SIZES

**IN THESE days of close competition, when cost of production means so much The SYMONS CONE CRUSHERS are given first consideration. • • •**

**WHY?**

**They increase production with — — — Less Cost and Less Replacement, Installed in Less Time and in Less Space than any other type of crusher.**




*The CONE in action*

**SYMONS BROTHERS COMPANY**

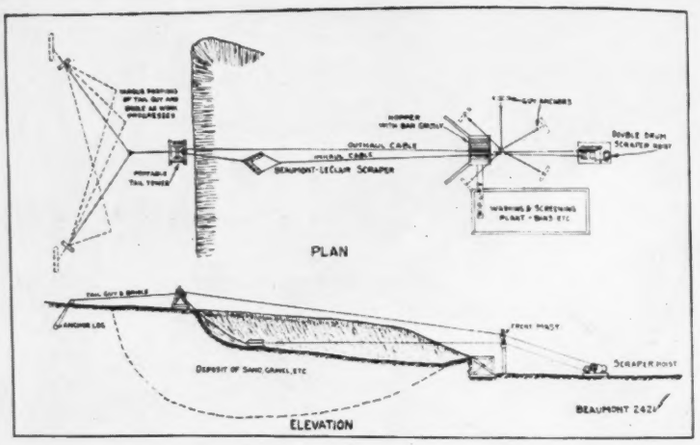
1462 STANLEY AVE.
LOS ANGELES (HOLLYWOOD)
CALIF.

111 W. WASHINGTON ST.
CHICAGO,
ILL.

51 E. 42nd ST.
NEW YORK,
N. Y.

# Cable Drag Scrapers






## Beaumont Cable Drag Scraper System

### Features

1. High Capacity.
2. Low First Cost.
3. Low Maintenance Cost.
4. Low Operating Cost.
5. Simplest System in Use.
6. One Man Operation.
7. Few and Rugged Parts.
8. Handles Fine or Lump Material.
9. High Salvage Value, on Account of Mobility.

THE Beaumont Cable Drag Scraper System is advocated by us as the best solution of the ground storage problem and for stripping overburden, working bank deposits of sand, gravel, clay, etc.

The system is not new. Placed on the market by us many years ago it achieved in mediate and sweeping success.

Machinery is reduced to its simplest form, consisting of a few rugged parts—scra double drum scraper winding machine, set of cables, sheaves and fittings.

Due to the few and rugged parts, not only is maintenance expense reduced to minimum, but installation costs are surprisingly low.



D

A CABLE to which the s the scraper winding ma flexibility of operation.

One cable—the load cabl winding machine to the fr cable—runs from the rear dr and thence over the necessary

By throwing a lever the the load cable in operation, a and the cutting edge digs, th

When the scraper is loa charge point.

By releasing the front dr the return cable is put in op

The scraper is dragged b any desired place on the hau

Scraper Handling San

*If you are interested in cutting costs, write for catalog No. 95*

*Page 2 of this catalog is reproduced above*

A system that can be adapted to the requirements of the small plant handling 100 cubic yards of sand or gravel per day or to the plant handling 2000 cubic yards.

**R·H· BEAUMONT CO.**

**320 Arch St., Philadelphia, Pa.** **2103—A Straus Building, Chicago, Ill.**

# Using PLYMOUTHS since 1922

MONOLITH PORTLAND CEMENT COMPANY

MONOLITH
PORTLAND CEMENT
PLASTIC WATERPROOF PORTLAND CEMENT

June 18th, 1928

Fate-Root-Heath Company,
Plymouth, Ohio.

Gentlemen:

We have in our organization two eight-ton and one twelve-ton Plymouth Gasoline Locomotives, narrow gauge. They have been in constant operation for several years, giving us the best of satisfaction.

If we ever are in the market for more locomotives, we will be very glad to give the Plymouth consideration.

Yours very truly,
MONOLITH PORTLAND CEMENT COMPANY
M. A. Garrison
Superintendent

50 ton Gasoline or Diesel

The PLYMOUTH LINE OF GASOLINE AND DIESEL LOCOMOTIVES IS COMPLETE FROM 2 TON TO 50 TON SIZES

PLYMOUTH LOCOMOTIVES

Monolith Portland Cement Company have used Plymouth Locomotives from the beginning of their record, having had two eight ton Plymouths previous to purchasing the twelve ton job on which they send us the following data, dated June eighteenth, 1928.

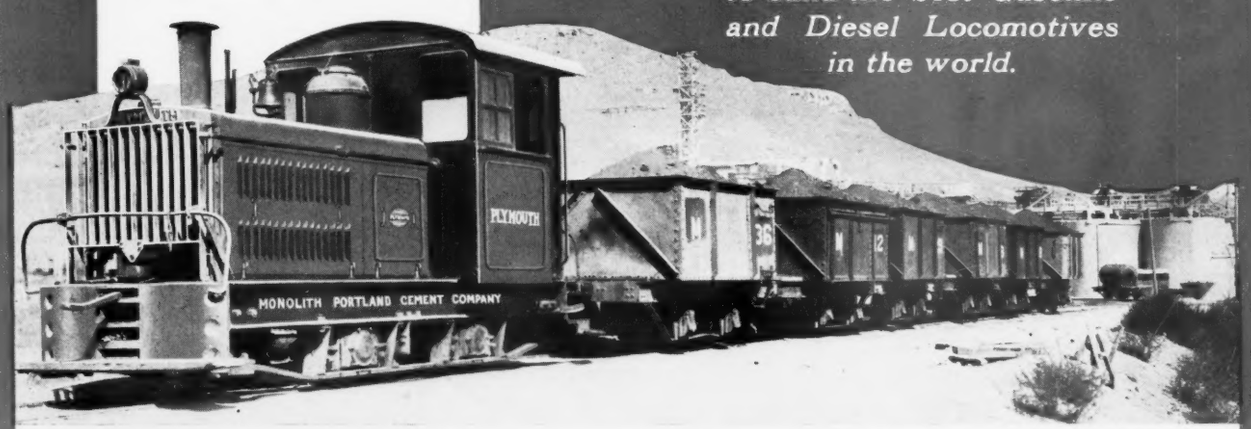
The length of their haul is fifteen hundred feet over a thirty-six inch gauge track having grades up to three per cent and curves thirty to forty-five degree radius. The trips are made with twelve loaded cars or a gross load of one hundred and five tons. In an eight hour shift the net tonnage hauled averages four hundred tons. The working hours vary from nine to eighteen hours and the twelve ton Plymouth uses an average of only fifteen gallons of gasoline in eight hours.

Sixty per cent of our locomotive sales are repeat orders.

As builders of both Gasoline and Diesel powered locomotives we are in position to give you an unbiased recommendation as to the type best adapted to solve your problem.

PLYMOUTH LOCOMOTIVE WORKS
*The Fate-Root-Heath Company*
206 Riggs Avenue
PLYMOUTH, OHIO

ONE DOMINANT PURPOSE
*to build the best Gasoline and Diesel Locomotives in the world.*




# PLYMOUTH
## *Gasoline and Diesel Locomotives*

# FORD "AA" TRUCKS

*Equipped with*

**St.Paul**

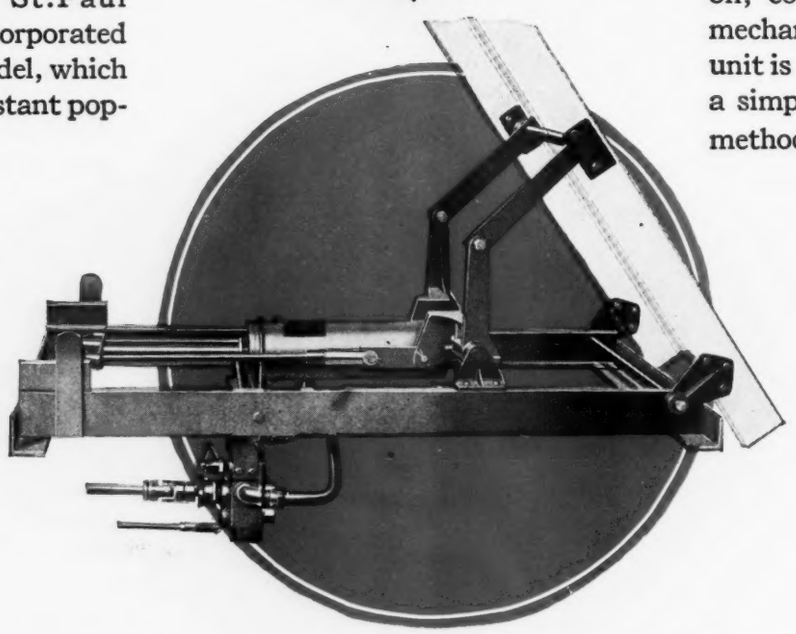
VERTICAL AND UNDERBODY
HYDRAULIC HOISTS

***Now Ready!***

New Model 4UBS St.Paul Underbody Hydraulic Hoist, designed for Ford Model "AA" one and one-half ton trucks. The high dumping angle, quick load discharge and economy of operation, characteristic of St.Paul Hoists, are incorporated in this new model, which has met with instant popularity.

***Complete Assembly***

consists of the parts pictured in black, namely, the hoist with pump; and the necessary high and low pressure piping, hoist sub-frame, body hinge rod and body guides and hinges, also power take-off, control and driving mechanism. The entire unit is ready to mount by a simple and inexpensive method.



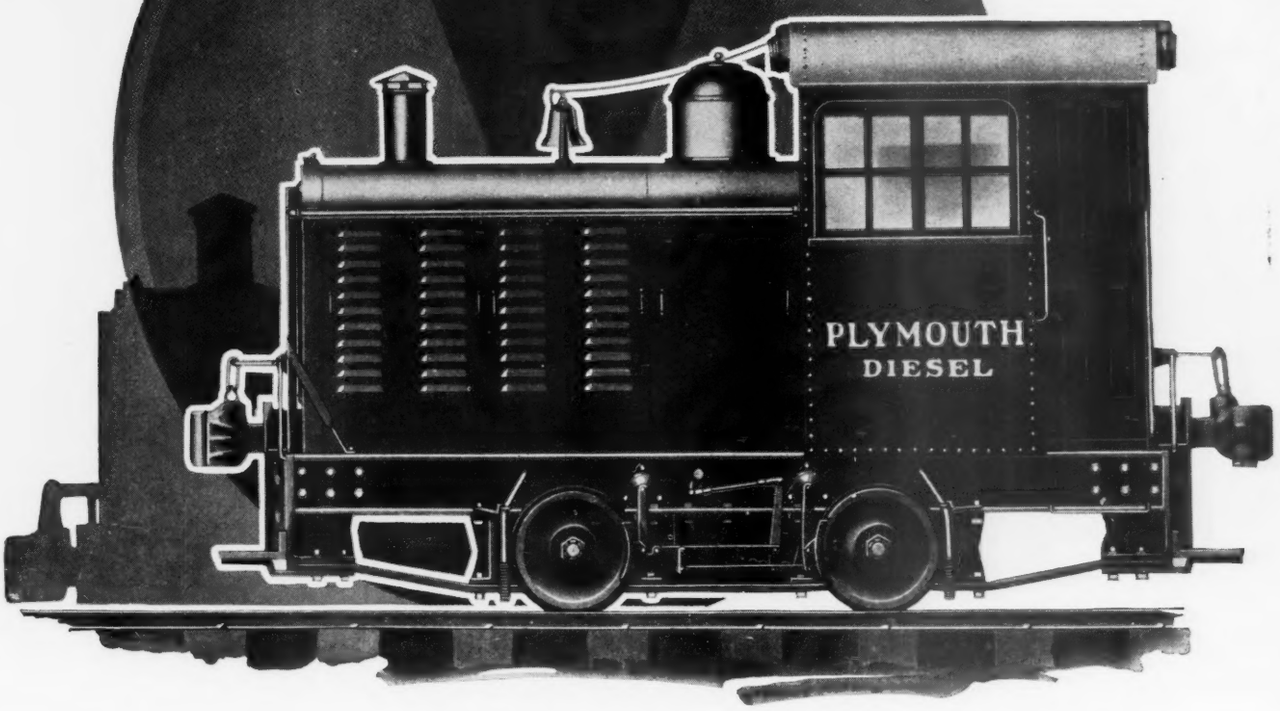
## Hydraulic Hoist Manufacturing Co.

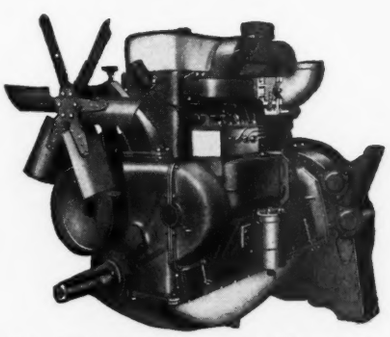
**Factories at St.Paul, Minnesota. Distributors and Service Stations Everywhere**

**Write for Name and Address of One Nearest You**

*"Ask the Dump Truck Driver on the Job"*

# One-Fifth the Fuel Cost



The Buda-M.A.N. is a *full* Diesel—four stroke cycle—solid fuel injection—compressorless—light weight—compact—high speed—conservatively rated—easy to operate—starts instantly from cold—requires no heating devices or auxiliaries—a self-contained, highly efficient, dependable power unit.

## *Plymouth Locomotives*

### *Powered with*

## *Buda-M.A.N. Diesel Engines*

WORKING continuously, the Model JLD 15-ton Plymouth Locomotive will use from 18 to 20 gallons of fuel oil a day. Fuel oil costs 5 to 8 cents a gallon, depending upon the locality and the quantity purchased.

Add to this the fact that the Buda-M.A.N. Diesel Engine uses fuel two or more times as efficiently as ordinary power units, and it is evident that the Model JLD Diesel Locomotive reduces fuel costs to a minimum.

Write direct to the Plymouth Locomotive Works, Plymouth, Ohio, or use the coupon.

## THE BUDA COMPANY

HARVEY (*Chicago Suburb*) ILLINOIS

BUDA M.A.N. DIESEL POWER

**BUILDING AMERICA *with* BUDA POWER**

THE BUDA COMPANY, Harvey, Ill.
Please send me a copy of Bulletin 654K on Buda-M.A.N. Diesel Engines

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Company.....

City..... State.....

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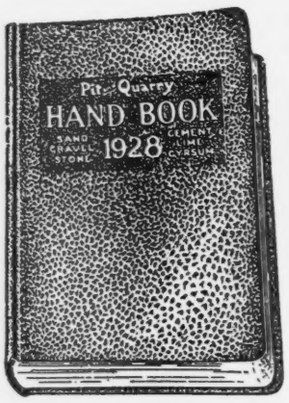


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**W. J. Garrison, manager, Silicon Products Co., Ridgeway, Pa.**—We certainly want to compliment you on the arrangement and very artistic appearance of the 1928 HAND BOOK.

**Adam L. Beck, president, Great Lakes Portland Cement Corp., Buffalo, N. Y.**—It is a very comprehensive book and contains many interesting facts.

**C. E. Claus, superintendent, Columbia Quarry Co., Columbia, Ill.**—We think a lot of this publication and believe it is the best compilation of reliable data on our industry available, reflecting great effort on the part of those responsible for its publication and distribution. We feel that it raises the standard of those who take advantage of the information it contains.

**H. M. Seibert, general manager, Ohio Lime and Stone Co., Pemberville, Ohio**—It is worth its weight in gold.

**M. H. McGaffigan, acting superintendent, Michigan State Cement Industry, Chelsea, Mich.**—Quite a number of technical articles the writer has enjoyed, pointing out as they have results obtained from actual experience of varied character but yet pertinent to the industry as a whole. The raising of the curtain, so to speak, on what actually is transpiring throughout the country as a whole, gives the reader first-hand information which would be otherwise difficult to obtain and PIT and QUARRY, to the writer's mind, is indispensable.

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Here are pictured three crushing plants of medium capacity,—"Good Roads" equipped throughout. Production is steadily maintained at a low cost at each of them—and HOW?

*Good* Management—

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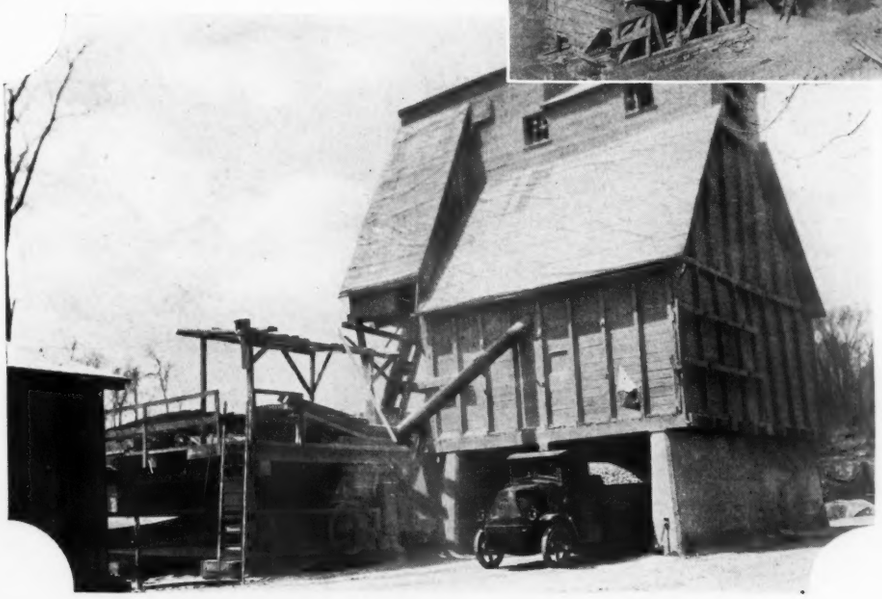

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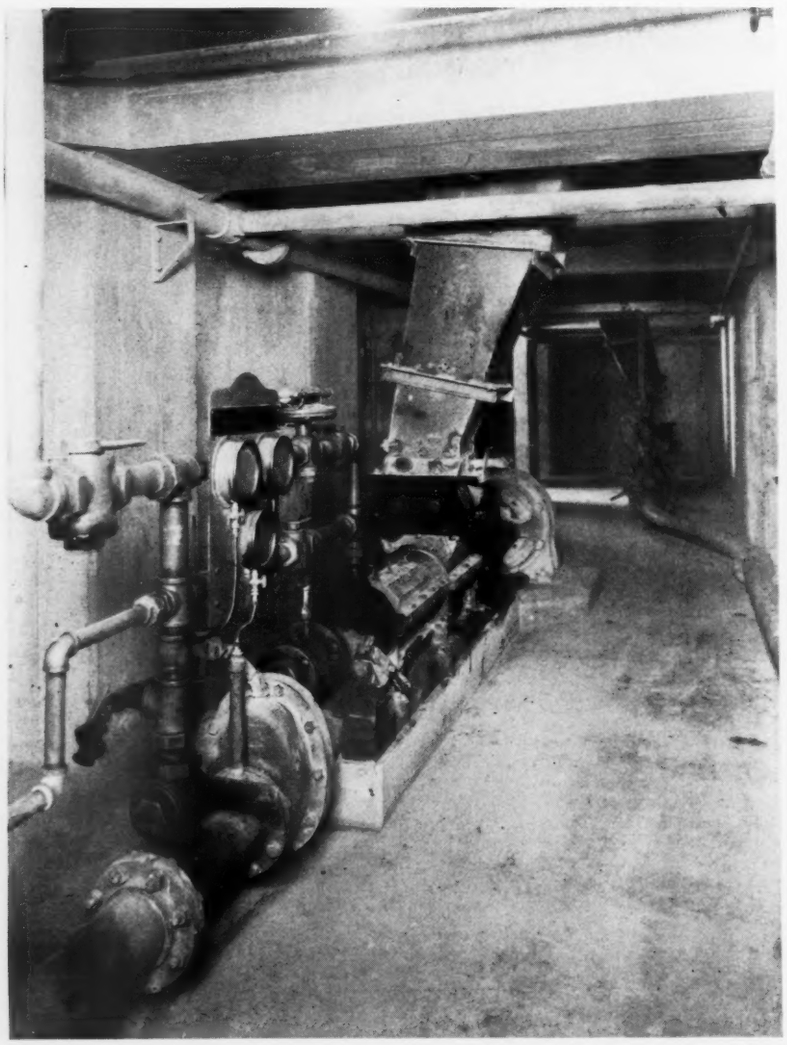
# At the new Dry Process plant of the C all Pulverized M



Two of the four six-inch Fuller-Kinyon Pumps withdrawing raw material from the correction tanks.

Eleven Fuller-Kinyon Systems including eighteen Fuller-Kinyon Pumps handle all pulverized materials at the newest dry process plant, the Boettcher Plant of the Colorado Portland Cement Company. Inter-connected pipe lines and automatic and remote control of some of these systems provide for flexibility of material distribution that is unique in cement plant practice.

This plant has demonstrated that a dry plant can have all of the advantages of a wet process plant, and is producing cement of the highest possible quality and of absolute uniformity. Mixing and blending of the dry pulverized raw materials is accomplished by a Fuller-Kinyon System under timed automatic and remote control. Supervision is reduced to a minimum, and the kiln feed error reduction is comparable to the best wet practice.

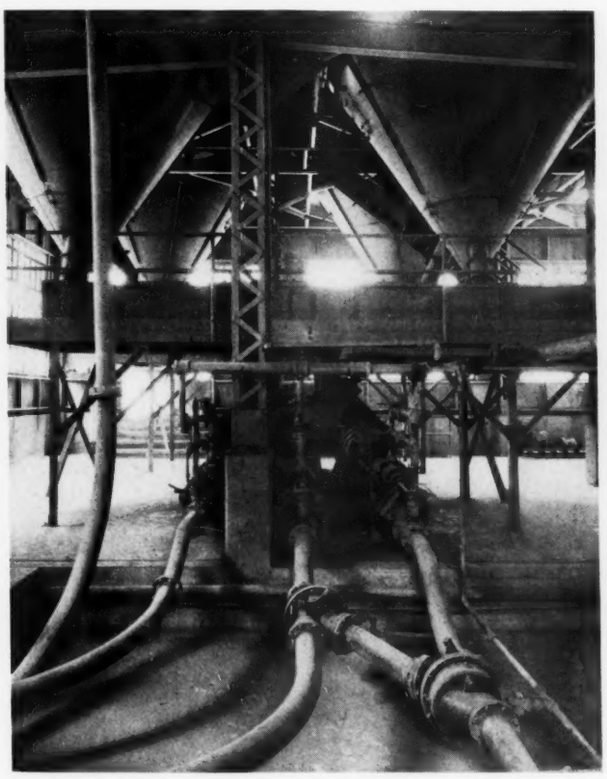
Fuller-Kinyon Systems in this plant convey the product of the raw mills either to the bins above the three air separators or directly through a branch line to the correction tanks. Below the air separators the three pumps shown in the lower left-hand photograph handle both the fines and rejects. The rejects are returned through the small pipe line, shown on the left of the photograph, to the raw mill feed bins, and the pump on the right diverts the flow to the correction tanks. The central pump serves as a spare and is inter-connected to both of these systems. A small pump below the Cottrell precipitators and a similar pump below the waste heat boiler hoppers deliver flue dust to the correction tanks. Below the four correction tanks, four Fuller-Kinyon Pumps discharging into the same pipe lines alternately convey to the kiln bins and recirculate the material for blending purposes under automatic and remote control. Finished cement is delivered by Fuller-Kinyon Systems either to the two air separator bins, adjacent to the raw material separators, or directly to the silos. Distribution of cement into the silos is accomplished under automatic and remote control of the distributing valves and the control panel is provided with timed controlled mechanism to blend the finished cement when this is desirable. Below the finished cement air separators, fines and rejects are handled by three pumps arranged similarly and to the rear of those shown in the lower left-hand photograph.

# Colorado Portland Cement Co.
## Materials are Handled by
# FULLER-KINYON SYSTEMS

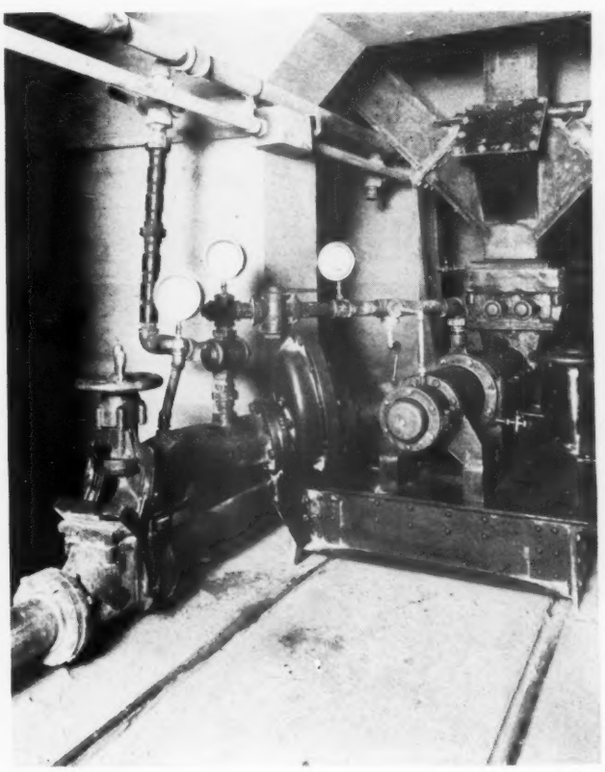
The rejects are delivered to the clinker belt conveyor for delivery to the mill bins, and the fines are delivered to the silos through the same pipe line described above.

Withdrawals from the silos are made by two portable Fuller-Kinyon Pumps, one of which is shown in the lower right-hand photograph. Deliveries are made to the four packer bins through two independent systems under automatic and remote control and operated from the same panel. Packer spill is collected and returned to one of the packer bins by a small pump.

The number of main transport lines has been reduced to a minimum by inter-connecting different systems to effect the same distribution that would be accomplished by independent conveyors. The flow sheet of the plant is ideal, and the fullest advantage has been taken of shipping facilities. The silos and packhouse are located between two sidings, and the cement transport line leading from the air separators with its branch from the mill building is buried underground.



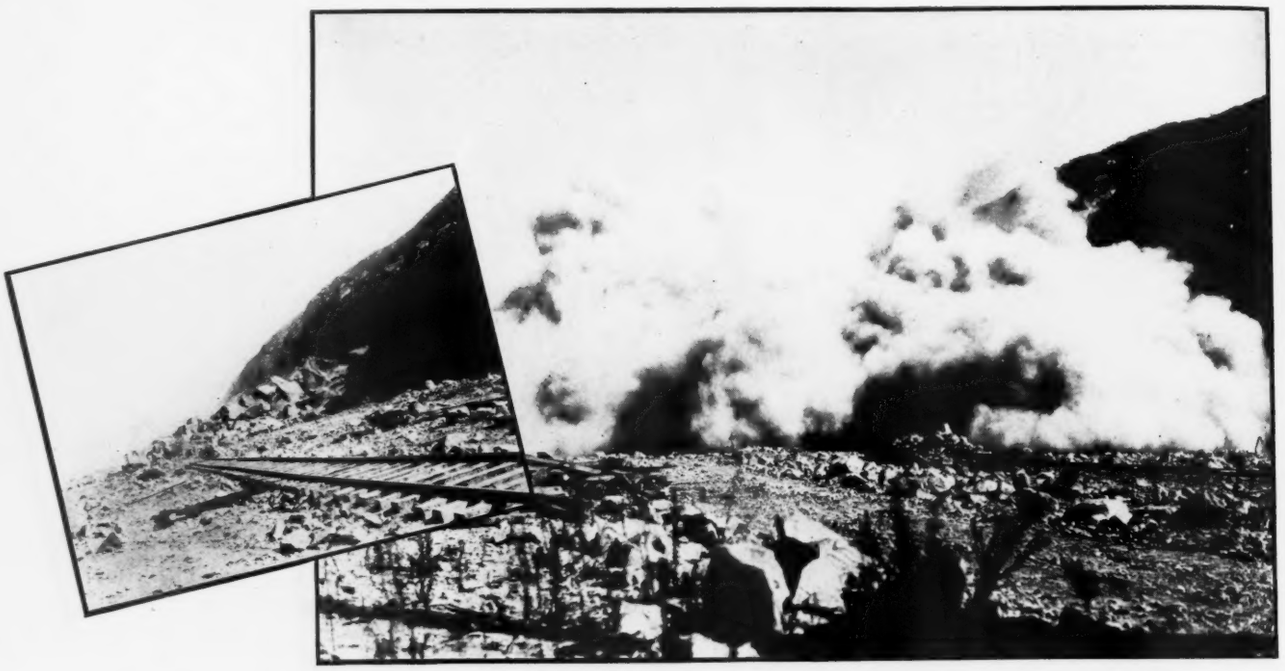
Raw material pumps below the air separators. The pump on the left is returning rejects to the mill bin. The right-hand pump is delivering fines to the blending silos. The central pump is a spare for both systems. The vertical pipe line is delivering the product of the mills to the air separators.



One of the two portable pumps withdrawing finished cement from the silos. These two systems deliver to four packer bins under automatic and remote control.

# FULLER COMPANY, CATASAUQUA, PA.

# *For the 2nd Largest Blast on the Pacific Coast—*



# CORDEAU-BICKFORD *was Used*

*Cordeau-Bickford detonating fuse always justfies its choice. Send for our book "Safety Fuse." A copy, without obligation, awaits your request.*

ANOTHER notable demonstration of the safety and efficiency of Cordeau-Bickford detonating fuse was the recent single blast near Riverside, California, in connection with harbor improvement at Newport Beach, California. The immense quantity of stone brought down was used in constructing a jetty 1000 feet into the ocean.

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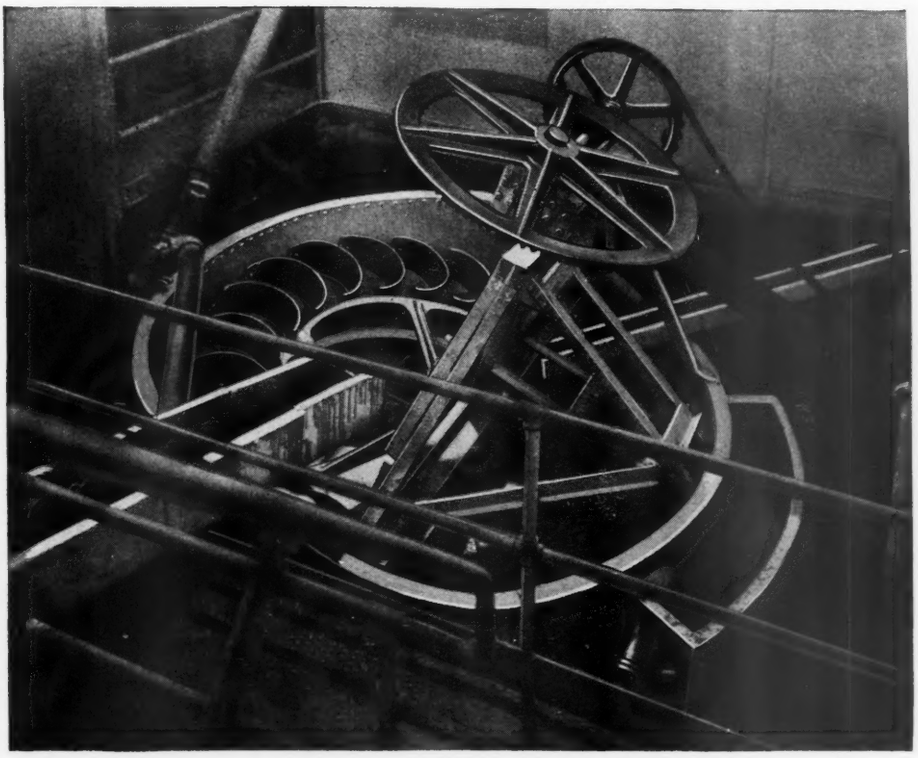

# Preparing Fine Shells for Cement Manufacture

## —*a New Use for the Dorrco Sand Washer*

THE Dorrco Sand Washer, already widely used for washing silt and organic impurities from bank or dredge sand, finds another interesting application in an allied industry.

The machine illustrated above is operated by the Pacific Portland Cement Co. for removing clay from fine oyster shells, preparing the shells for use as a raw material in cement manufacture.

Dorr Washers (standard type) have been in use for some time at another plant, washing coarse shells and marl for a similar purpose. This successful application of the Sand Washer for preparing the fine shells rounds out a complete washing service for cement plants using shells or marl as a raw material.

If, in your plant, you have an unusual or difficult washing problem, you will be interested in Bulletins 4071 and 4171 which describe these machines. Our nearest office will gladly send you copies.

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INVESTIGATION TESTS DESIGN EQUIPMENT

# "Better Pleased With Our Brookville Every Day"

Quoting from a Brookville customer, Mr. S. L. Allen, of Arriete, Cuba, which pertains to a standard 8-ton Model "IBW" shown above under operation.

Brookville customers can not be other than enthusiastic. In this instance twenty-five three-ton cars, or gross of seventy-five tons was guaranteed against 1½% grade. Thirty cars with gross of ninety tons are actually employed, with maximum train up to forty cars.

## NEW MODELS—RADICAL IMPROVEMENTS

***with all of the better features on the older models retained.***

"Too big for the job" quoting from a Brookville booster who has used one of the later 4-ton Model "IBS" during 1928, this particular machine at times requiring a full seven ton load against 11% grade.

"The best locomotive you have ever built" from another 4-ton "IBS" customer, who has used four Brookvilles, the first dating back to 1922.

The Improved Brookville Line consists of these six standard Models, with McCormick-Deering tractor power units:

**4 Ton Model "IBS"**
**5 Ton Model "IBZ"**
**6 Ton Model "IBY"**
**8 Ton Model "IBW"**
**10 Ton Model "IBV"**
**12 Ton Model "IBU"**

When selecting locomotives, service should be the dominating factor. The Brookville-McCormick-Deering offers service that cannot be excelled, considering that there is no feature connected with Brookville mechanism, barring extreme accident, that can place machine out of commission. There is not a machined McCormick-Deering part which means service on parts for the McCormick-Deering power unit or heart of the locomotive, from International Harvester Branches or McCormick-Deering dealers, both located in all parts of the United States, Canada, etc.

*Current literature with complete catalog, furnished upon request, without obligation.*

**BROOKVILLE LOCOMOTIVE COMPANY, Brookville, Pa., U. S. A.**

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**GASOLINE LOCOMOTIVES**

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For the convenience of readers who are in the market for equipment, our Free Service Department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits, quarries and mills. The coupon below makes it easy for you. Simply check, sign and mail:

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- ☐ Cars, dump, end
- ☐ Cars, dump, side
- ☐ Cars, gondola
- ☐ Cars, kiln
- ☐ Car stops
- ☐ Carts, dump
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- ☐ Drills, hand hammer
- ☐ Drills, pneumatic
- ☐ Drills, tower
- ☐ Drills, tripod
- ☐ Drills, well
- ☐ Drill steel
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- ☐ Drives, chain
- ☐ Drives, rope
- ☐ Drums, cement and lime
- ☐ Dryers, rotary
- ☐ Dryers, sand and gravel
- ☐ Dryers, stationary
- ☐ Dryers, tower
- ☐ Dry pan parts, cast steel
- ☐ Dry pan parts, manganese steel
- ☐ Dry pan parts, special metals
- ☐ Dry pans
- ☐ Dust collecting systems
- ☐ Dynamite
- ☐ Dynamos
- ☐ Eccentrics, shaker and drive
- ☐ Economizers, fuel
- ☐ Elevator parts, manganese steel
- ☐ Elevator parts, special metals
- ☐ Elevators, bucket
- ☐ Elevators, pivoted bucket
- ☐ Engineers, designing, manufacturing, contracting
- ☐ Engines, Diesel
- ☐ Engines, gas
- ☐ Engines, gasoline
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- ☐ Engines, hydraulic pumping
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- ☐ Fire alarm systems
- ☐ Fire brick
- ☐ First aid kits, supplies
- ☐ Flanges, pipe, hydraulic
- ☐ Feeders, flue dust
- ☐ Fordson attachments
- ☐ Forgings, steel
- ☐ Frogs and switches
- ☐ Furnaces, drill steel
- ☐ Fuses, blasting
- ☐ Fuses, electrical
- ☐ Fuses, safety
- ☐ Galvanometers
- ☐ Gaskets
- ☐ Gaskets, metallic
- ☐ Gas, oxygen
- ☐ Gas producers
- ☐ Gears
- ☐ Generators, acetylene
- ☐ Generators, electric
- ☐ Generator sets, electric motor
- ☐ Generator sets, engine
- ☐ Generator sets, turbine
- ☐ Goggles, safety
- ☐ Governors
- ☐ Grapples, stone
- ☐ Grates, boiler
- ☐ Grating, areaway
- ☐ Grating, steel
- ☐ Grinders, pneumatic, portable
- ☐ Grinding balls
- ☐ Grinding pans
- ☐ Grizzlies
- ☐ Grizzlies, manganese steel
- ☐ Guns, grease
- ☐ Guns, hydraulic
- ☐ Hangers
- ☐ Hoists, air
- ☐ Hoists, chain
- ☐ Hoists, derrick
- ☐ Hoists, drum
- ☐ Hoists, electric, portable
- ☐ Hoists, Fordson
- ☐ Hoists, hand
- ☐ Hoists, motor truck body
- ☐ Hoists, overhead, electric
- ☐ Hoists, skip
- ☐ Hoists, steam cylinder
- ☐ Hopper parts, manganese steel
- ☐ Hopper parts, special metals
- ☐ Hoppers
- ☐ Hose and hose accessories
- ☐ Hose, air, steam, water
- ☐ Hose, sand suction
- ☐ Hose, welding
- ☐ Hulls, steel
- ☐ Hulls, steel sectional
- ☐ Hydrators
- ☐ Idlers
- ☐ Indicators, recording instruments
- ☐ Industrial railway systems
- ☐ Kettles, calcining
- ☐ Kiln parts, cast steel
- ☐ Kilns, rotary
- ☐ Kilns, vertical

*(Over)*

- ☐ Ladders, hydraulic dredge
- ☐ Lights, carbide
- ☐ Lights, electric flood
- ☐ Linings, bag and barrel
- ☐ Linings, ball and tube mill
- ☐ Linings, kiln
- ☐ Loader parts, manganese steel
- ☐ Loaders, bin, portable
- ☐ Loaders, box car
- ☐ Loaders, bucket conveyor
- ☐ Loaders, hopper
- ☐ Loaders, underground
- ☐ Locomotives, air
- ☐ Locomotives, cable
- ☐ Locomotives, Diesel
- ☐ Locomotives, gasoline
- ☐ Locomotives, oil-electric
- ☐ Locomotives, steam
- ☐ Locomotives, steam, fireless
- ☐ Locomotives, storage battery
- ☐ Locomotives, trolley
- ☐ Log washer parts, manganese steel
- ☐ Log washer parts, special metals
- ☐ Log washers
- ☐ Lubricants
- ☐ Lubricating systems.

- ☐ Machinery, prospecting
- ☐ Marble and granite working equipment
- ☐ Material distributors
- ☐ Measuring devices
- ☐ Menders, hose
- ☐ Meters, electric current
- ☐ Meters, oil
- ☐ Meters, water
- ☐ Mill parts, cast steel
- ☐ Mill parts, manganese steel
- ☐ Mill parts, special metals
- ☐ Mills, attrition
- ☐ Mills, ball and pebble
- ☐ Mills, chaser
- ☐ Mills, compartment
- ☐ Mills, conical
- ☐ Mills, hammer
- ☐ Mills, rod
- ☐ Mills, roll
- ☐ Mills, tube
- ☐ Mills, vertical emery
- ☐ Mixers, dry
- ☐ Mixers, plaster
- ☐ Motor control systems
- ☐ Motors, electric
- ☐ Motors, gasoline
- ☐ Motors, gasoline, portable power unit
- ☐ Motor trucks
- ☐ Mushing machines

- ☐ Nipples, pneumatic
- ☐ Nozzles, hydraulic mining
- ☐ Nozzles, suction hose
- ☐ Nuggets, grinding

- ☐ Oils and lubricants
- ☐ Overhead track systems

- ☐ Packers, bag
- ☐ Packings, rod and sheet
- ☐ Perforated metal
- ☐ Picks, hand
- ☐ Pilers, bag and package
- ☐ Pipe and fittings, hydraulic
- ☐ Pipe and fittings, iron
- ☐ Pipe and fittings, spiral
- ☐ Pipe and fittings, structural
- ☐ Pipe cutters
- ☐ Planers, stone
- ☐ Plants, asphalt (complete)
- ☐ Plants, cement (complete)
- ☐ Plants, crushed stone (complete)
- ☐ Plants, crushing, portable (complete)
- ☐ Plants, gypsum (complete)
- ☐ Plants, industrial
- ☐ Plants, lime (complete)
- ☐ Plants, sand and gravel (complete)
- ☐ Plows
- ☐ Poidometers
- ☐ Pontoons
- ☐ Powder
- ☐ Powder magazines
- ☐ Power transmitting equipment
- ☐ Presses, boring
- ☐ Presses, hydraulic
- ☐ Pulleys
- ☐ Pulleys, cast iron
- ☐ Pulleys, clutch
- ☐ Pulleys, magnetic
- ☐ Pulverized fuel systems
- ☐ Pulverizer parts, manganese steel
- ☐ Pulverizer parts, special metals
- ☐ Pulverizers, ball, conical, pebble
- ☐ Pulverizers, disc
- ☐ Pulverizers, hammer
- ☐ Pulverizers, ring
- ☐ Pulverizers, rod
- ☐ Pulverizers, roll
- ☐ Pump parts, manganese steel
- ☐ Pump parts, special metals
- ☐ Pumps, air lift
- ☐ Pumps, boiler feed
- ☐ Pumps, centrifugal
- ☐ Pumps, deep well
- ☐ Pumps, diaphragm
- ☐ Pumps, drainage
- ☐ Pumps, dredging
- ☐ Pumps, force
- ☐ Pumps, pulverized coal
- ☐ Pumps, sand and gravel
- ☐ Pumps, slurry
- ☐ Pumps, steam
- ☐ Pumps, water supply
- ☐ Pyrometers

- ☐ Radiators, engine cooling
- ☐ Rails
- ☐ Refractories
- ☐ Rheostats
- ☐ Rivet forges, electric
- ☐ Rivet forges, oil
- ☐ Rivet forges, pneumatic
- ☐ Roller bearings
- ☐ Rollers, conveyor
- ☐ Rolls, crushing
- ☐ Roofing and siding
- ☐ Rope, manila
- ☐ Rope preservative, wire
- ☐ Rope, wire

- ☐ Safety appliances
- ☐ Sand blast equipment
- ☐ Sand-lime-brick machinery
- ☐ Saws, stone
- ☐ Scales, conveyor
- ☐ Scales, platform
- ☐ Scales, track
- ☐ Scales, truck
- ☐ Scales, warehouse
- ☐ Scows, dump
- ☐ Scraper parts, manganese steel
- ☐ Scraper parts, special metals
- ☐ Scrapers, dragline
- ☐ Scrapers, power drag
- ☐ Scrapers, road, drag
- ☐ Scrapers, road, wheeled and drag
- ☐ Screen parts, revolving, manganese steel
- ☐ Screen parts, revolving, special metals
- ☐ Screen plates
- ☐ Screens, coal washing
- ☐ Screens, laboratory
- ☐ Screens, revolving (complete)
- ☐ Screens, shaking (complete)
- ☐ Screens, vibrating (complete)
- ☐ Separators, air
- ☐ Separators, dry centrifugal
- ☐ Separators, gypsum
- ☐ Separators, magnetic
- ☐ Shafting
- ☐ Sheaves
- ☐ Shovel parts, manganese steel, special metal
- ☐ Shovels, air power
- ☐ Shovels, Diesel power
- ☐ Shovels, electric power
- ☐ Shovels, gasoline power
- ☐ Shovels, gas+air power
- ☐ Shovels, hand
- ☐ Shovels, power, underground
- ☐ Shovels, steam power
- ☐ Shovels, tractor
- ☐ Silos, concrete and steel
- ☐ Skips
- ☐ Sleeves, dredge
- ☐ Slings, wire rope
- ☐ Slugs and nuggets, grinding
- ☐ Speed reducers and gears
- ☐ Spouts
- ☐ Spouts, manganese steel
- ☐ Sprays
- ☐ Sprays, paint
- ☐ Sprockets
- ☐ Stacks, dust collecting
- ☐ Stacks, smoke
- ☐ Starters, automatic, motor
- ☐ Steel, high speed
- ☐ Steel, structural
- ☐ Steel, tool
- ☐ Stokers
- ☐ Strand
- ☐ Superheaters
- ☐ Switchboards, electric
- ☐ Switches, safety, electrical
- ☐ Switches, track
- ☐ Tachometers
- ☐ Tanks, air
- ☐ Tanks, concrete and steel
- ☐ Tanks, iron and steel
- ☐ Tanks, sand settling
- ☐ Tanks, wood
- ☐ Test borings
- ☐ Testing laboratories
- ☐ Thickeners, slurry
- ☐ Thread for bag closing machines
- ☐ Ties and timbers
- ☐ Ties, bag
- ☐ Tools, drill, blast hole
- ☐ Torches, thawing
- ☐ Towers, steel and wood
- ☐ Track, portable
- ☐ Track and track materials
- ☐ Track shifters
- ☐ Tractors, crawler
- ☐ Tractors, electric
- ☐ Trailers, tractor and truck
- ☐ Tramways, aerial, complete
- ☐ Transformers, electric
- ☐ Trippers, belt
- ☐ Trippers, tramway
- ☐ Trucks, electric
- ☐ Trucks, tractor
- ☐ Turbines, hydraulic
- ☐ Turbines, steam
- ☐ Turntables, track
- ☐ Turntables, truck

- ☐ Unloaders, bin
- ☐ Unloaders, box car
- ☐ Unloaders, conveyor

- ☐ Valves, air
- ☐ Valves, oiler
- ☐ Valves, pump
- ☐ Valves, throttle

- ☐ Wagons, dump
- ☐ Washers and scrubbers, sand, gravel, stone
- ☐ Weighers, automatic
- ☐ Welding and cutting equipment
- ☐ Welding rods, manganese steel
- ☐ Welding supplies
- ☐ Wheels, car
- ☐ Winches
- ☐ Wire and cable, electric
- ☐ Wire, copper
- ☐ Wire, iron or steel
- ☐ Wire, welding
- ☐ Wire cloth
- ☐ Wire cloth, manganese steel

*To to be used for*_____

_____

_____

*Firm Name*_____

*Address*_____

*Your Name*_____ *Title*_____

9-26-28

# The New Lidgerwood

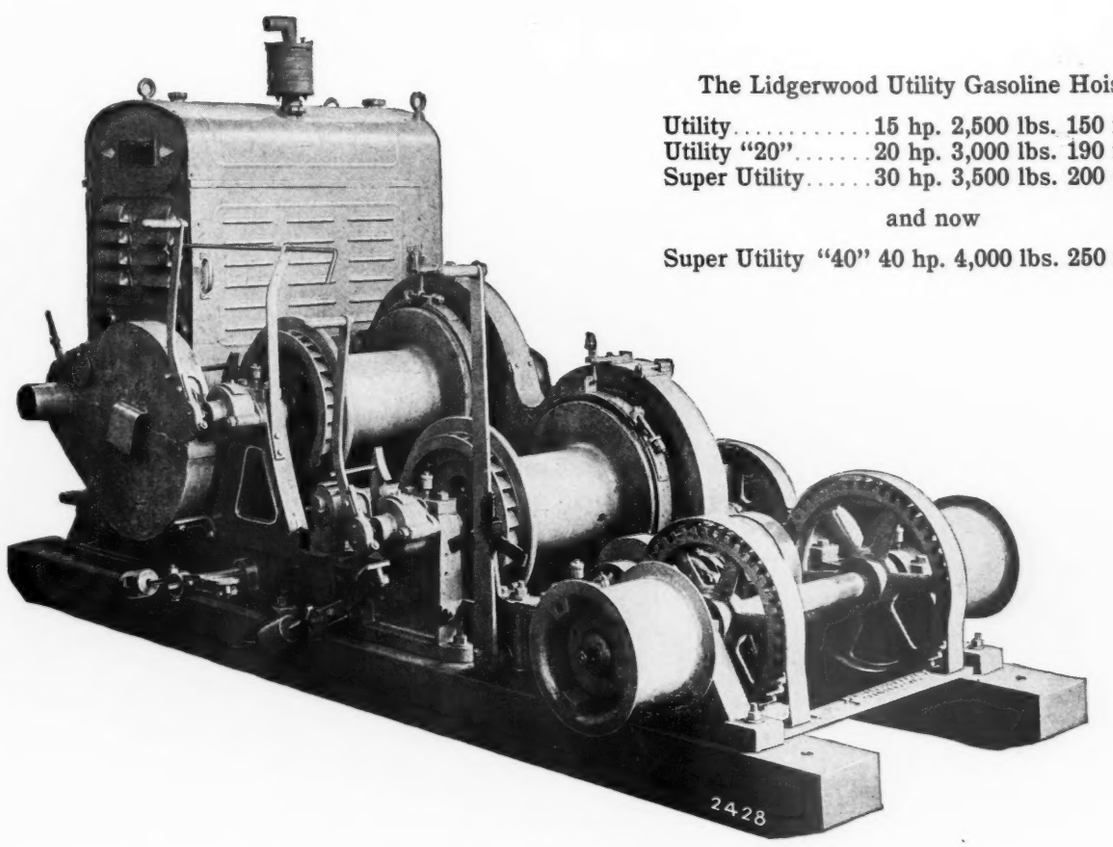
# Super Utility 40

**An excellent derrick hoist.**

**4000 lbs. single line pull at 250 f. p. m.**

**Husky enough for heavy stone; plenty of speed for every-day hoisting; costs so little to operate you can use it profitably on your light loads.**

**Carried in stock for immediate shipment.**




**The Lidgerwood Utility Gasoline Hoists**

| | | | |
|---|---|---|---|
| Utility | 15 hp. | 2,500 lbs. | 150 f.p.m. |
| Utility "20" | 20 hp. | 3,000 lbs. | 190 f.p.m. |
| Super Utility | 30 hp. | 3,500 lbs. | 200 f.p.m. |

and now

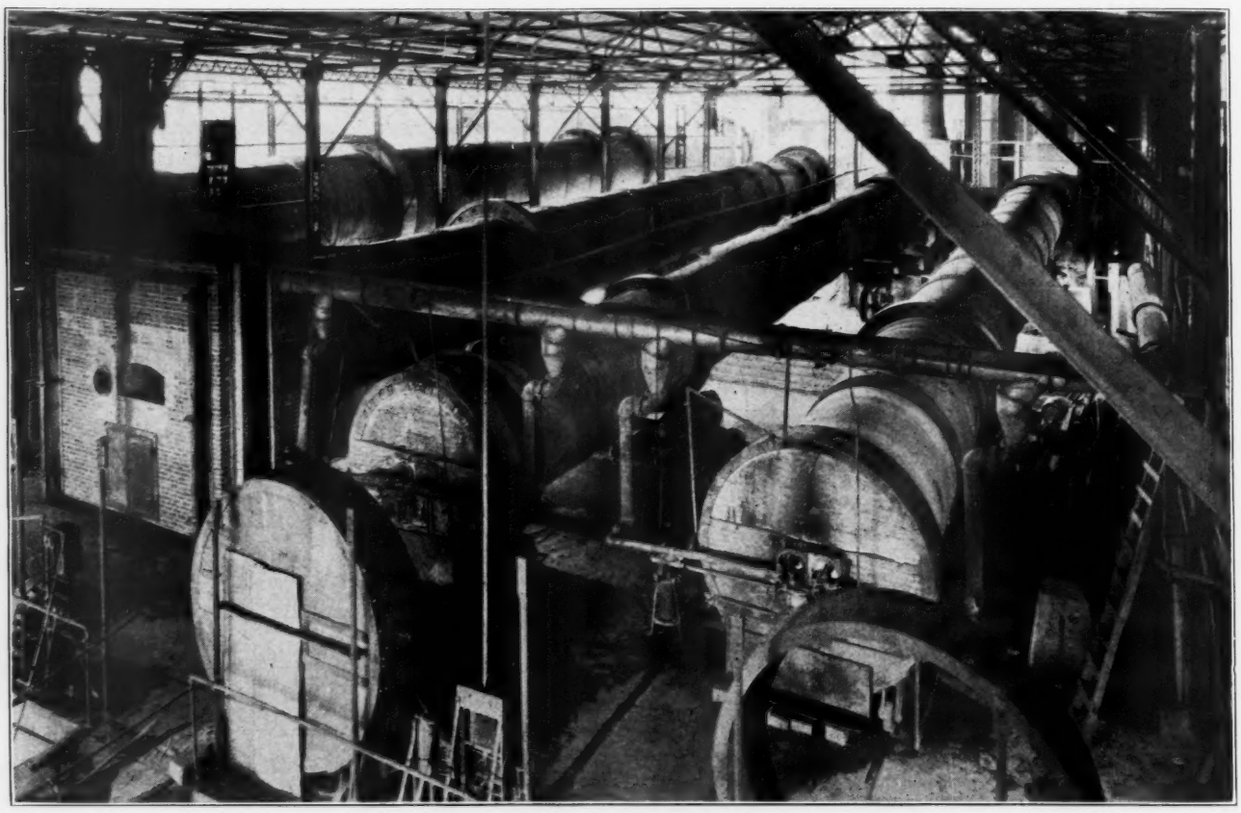
Super Utility "40" 40 hp. 4,000 lbs. 250 f.p.m.

## Lidgerwood Manufacturing Company

Elizabeth, New Jersey

# *Leadership*— on the Pacific Coast too!

They do things in a big way out on the coast! So it's not surprising to find that western cement manufacturers and quarry operators turn to Traylor for their equipment. Our illustration shows the interior of the Kiln Room at the Monolith Cement Co. plant at Monolith, Calif., in which the largest two-bearing Cement Kiln in the U. S. is installed. And at Riverside is the largest Jaw crusher in the cement industry. Both Traylor-built of course.



*Kiln Room of Monolith Portland Cement Co., Monolith, Calif.*

**9**

**IMPORTANT TRAYLOR INSTALLATIONS ON THE PACIFIC COAST**

CALIFORNIA PORTLAND CEMENT CO., COLTON, CALIF.
MONOLITH PORTLAND CEMENT CO., MONOLITH, CALIF.
PACIFIC COAST CEMENT CO., SEATTLE, WASH.
PACIFIC PORTLAND CEMENT CO., REDWOOD HARBOR, CALIF.
SANTA CATALINA ISLAND CO., AVALON, CALIF.
SOUTHWESTERN PORTLAND CEMENT CO., VICTORVILLE, CALIF.
SUPERIOR PORTLAND CEMENT CO., CONCRETE, WASH.
NORTHWESTERN PORTLAND CEMENT CO., GROTTO, WASH.
MONOLITH PORTLAND MIDWEST CO., LARAMIE, WYO.

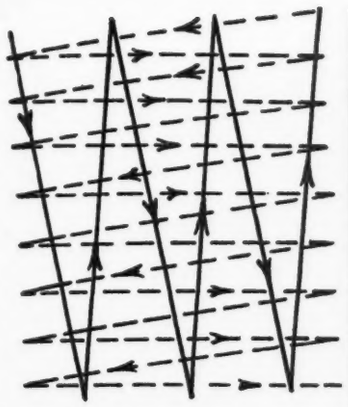
THE nine plants listed here are among the world's leading cement producers. Their output is enormous. Their product goes to build the miles of concrete roads, the bridges, the hundreds of miles of aqueducts and other concrete projects for which the West is justly famous. In addition to giant Kilns, Traylor equipment in these plants includes Traylor Jaw and Gyratory Crushers, Compartment Mills, Feeders, Clinker Rolls and other equipment . . . everything for the industry. Our engineers are at your service. Two Pacific Coast offices maintained to serve the coast. Write or wire your nearest office.

## TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN PENNSYLVANIA

New York City, 30 Church St.;
Chicago, 1414 Fisher Building;
Los Angeles, 605 Chester, Williams Bldg.;
Seattle, 815 Alaska Bldg.
Salt Lake City, 101 W. 2nd So. St.

Export Department—104 Pearl Street, New York City.
Foreign Sales Agencies: London, Johannesburg, Rangoon, Lima, Rio de Janeiro, Sao Paulo, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro.
European Works—Usines Carels Freres, Ghent, Belgium.



# Faster—closer grading with the Niagara!

***Here are the Reasons for Niagara Efficiency!***

A Horizontal and Vibratory action that cuts the sand **and cleans the screen at the same time.**

No variations in vibratory action due to positive action of eccentrics, giving unbelievable accuracy in material sizing. Dirt proof bearings that absolutely keep out grit or foreign matter either wet or dry. **This is a Niagara guaranteed feature.**

Niagara has a record of performance unequalled in the Pit and Quarry Industries. It is a record of production speeded up, greater accuracy in sizing and a new freedom from costly breakdowns and stoppages.

Niagara efficiency has proved itself an important factor in reducing production costs and stepping up profits. It is such efficiency that enabled the Fuller-Becker Sand & Gravel Co. of Detroit, Michigan, to size 494,000 tons of sand and gravel on one Niagara with but $12.00 in repairs.

Get the Niagara story as applied to your own specific requirements

Write today.

The list of Niagara users read like the "Blue Book" of the industry.

**Here are a few users of Niagara Screens.**
Dolomite, Inc.
General Crushed Stone
National Limestone
Wagner Quarries
Ohio Blue Limestone
Buffalo Crushed Stone
Fuller Becker Sand & Gravel Co.

# NIAGARA

## Ball Bearing, Counterflow Screens

Interchangeable screen panels from 8 in. opening to 325 mesh.

## NIAGARA CONCRETE MIXER CO. 40 Pearl St., Buffalo, N. Y.

**Canadian Office:**
WETTLAUFER BROS., Ltd.
178 Spadina Ave.
Toronto, Ont.

**Massachusetts:**
F. J. MORRISSEY
44 Marshall St.
Medford Hillside, Mass.

**Ohio Office:**
A. E. OWEN
1710 East 82nd St.
Cleveland, Ohio

**Illinois Office:**
J. L. WESTENHAVER
1118 West 41st St.
La Grange, Ill.

**Pennsylvania Office:**
J. S. MORRISON
Oliver Bldg.
Pittsburgh, Pa.

**California Office:**
C. R. INGERSOLL
800 West Washington Av. Blvd.
Los Angeles, Calif.

**New York Office:**
HODGE & DANA, Inc.
480 Lexington Ave.
New York, N. Y.

**Washington Office:**
Union Machinery & Supply Co.
Sixth Ave. and Lander St.
Seattle, Wash.

**Michigan Office:**
WETTLAUFER BROS.
2026 Michigan Ave.
Detroit, Mich.

**Oregon Office:**
Union Machinery & Supply Co.
275 Pine St.
Portland, Ore.

**Alabama Office:** CHAS. T. LEHMAN, 2300 Ave. A, Birmingham, Ala.

W. N. MILLER
McClurg Hotel
Wheeling, W. Va.

SHEARER & MAYER
Indianapolis, Ind.

R. L. DABNEY
2nd National Bank Bldg.
Houston, Texas

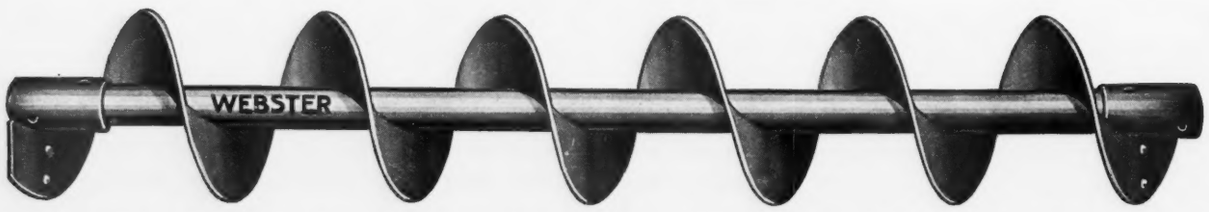
A. H. WESTON
Travelers Bldg.
Richmond, Va.

N. E. OTTERSON
1528 Sutter St.
San Francisco, Calif.

# WEBSTER

## *ELEVATING AND CONVEYING EQUIPMENT*

### *SCREW CONVEYOR*

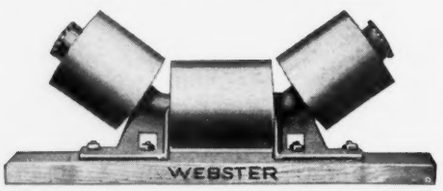



SECTIONAL FLIGHTS CUT FROM PLATE STEEL AND ROLLED TO FORM. UNIFORM IN THICKNESS FROM CENTER TO EDGE—THE GREATEST WEAR IS ON OUTSIDE EDGE. END FLIGHTS WHERE HEAVIEST DUTY IS PERFORMED ARE HEAVIER. DAMAGED FLIGHTS READILY REMOVED AND NEW FLIGHTS INSERTED.

### *ELEVATOR BUCKETS*

STEEL AND MALLEABLE IRON BUCKETS IN ALL SIZES AND STYLES.

### *CONVEYOR ROLLS*

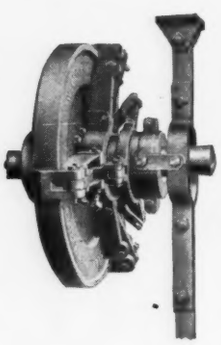



SEVERAL TYPES BELT CONVEYOR IDLERS FITTED WITH PLAIN, BALL OR ROLLER BEARINGS.

### *CHAIN*

A COMPLETE LINE OF CERTIFIED MALLEABLE IRON, COMBINATION AND STEEL CHAIN.

### *FRICTION CLUTCHES*



STEEL PLATE CLUTCHES ALSO A COMPLETE LINE OF POWER TRANSMITTING MACHINERY.

Whether your requirements are for chains, sprockets, elevator buckets, gears, bearings, hangers, friction clutches, elevator boots, renewal parts for screens, or complete equipment for handling any class of material, you can turn to Webster as a dependable source of supply.

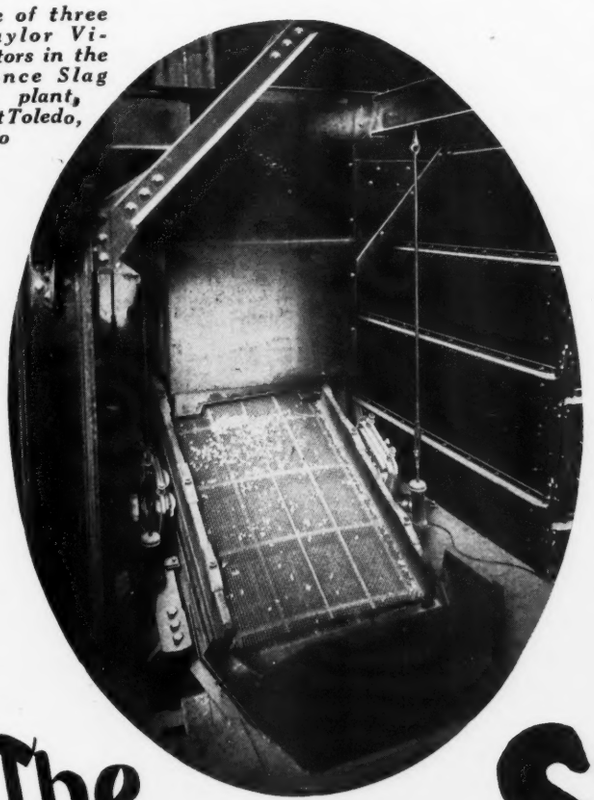
***Send us your inquiries***

## THE WEBSTER MFG. COMPANY

1856 North Kostner Avenue
CHICAGO

BUFFALO CINCINNATI CLEVELAND NEW YORK PHILADELPHIA PITTSBURGH
WEBSTER-BRINKLEY CO., SEATTLE
WEBSTER-INGLIS, LTD., TORONTO

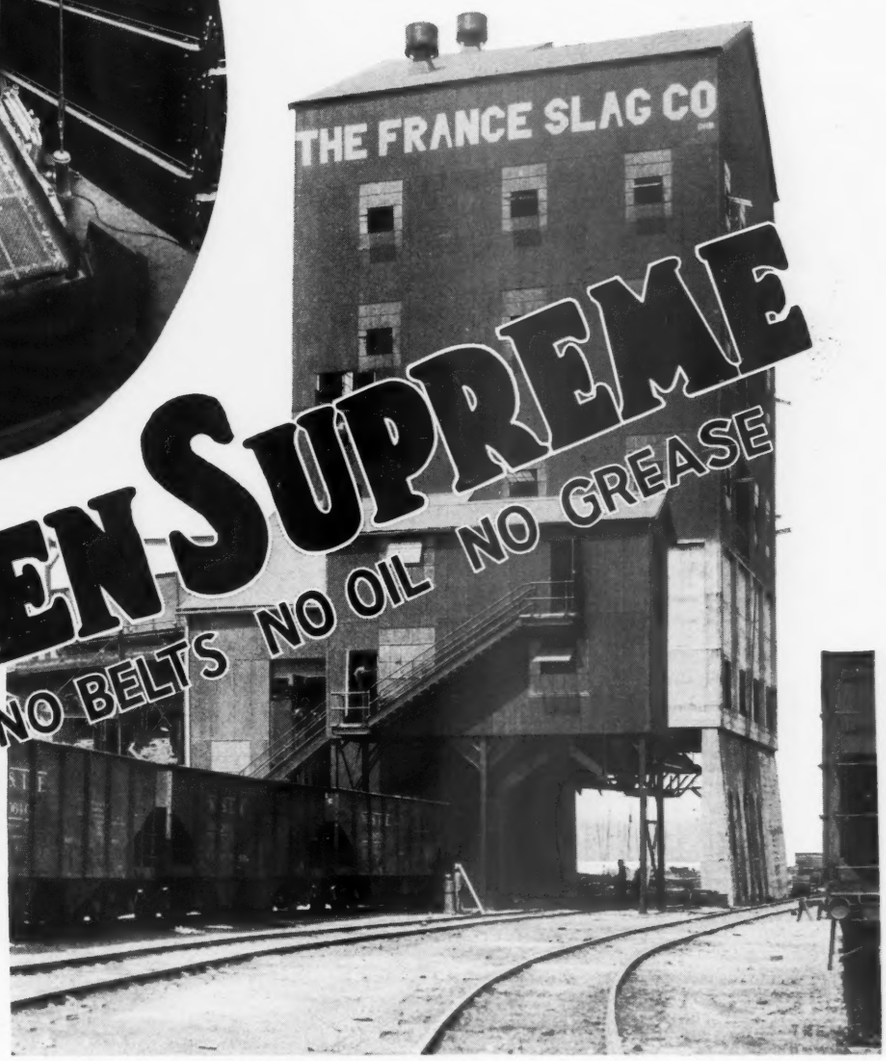
# What Makes a Plant MODERN?



*One of three Traylor Vibrators in the France Slag Co. plant, East Toledo, Ohio*

THREE fundamental factors — DESIGN, CONSTRUCTION and EQUIPMENT—combine to make the really **modern** plant. To allow any one of these to lag behind the others is to place a deliberate handicap on plant efficiency.

In the new plant of the France Slag Company, East Toledo, Ohio, are three Traylor Vibrators. Evidence that this company recognizes the wisdom of coordinating the best in plant design and construction with the best in screening equipment.




## The SCREEN SUPREME

NO BEARINGS NO BELTS NO OIL NO GREASE

THE TRAYLOR VIBRATOR COMPANY

**1400-12 DELGANY STREET DENVER, COLORADO**

REPRESENTATIVES AND BRANCH OFFICES

MAYER & OSWALD
332 So. La Salle St.
Chicago, Ill.

SAN FRANCISCO, CALIF.
75 Fremont St.

M. S. DENNETT CO.
Lexington Bldg.
Detroit, Mich.

SEATTLE, WASH.
Hotel Frye

NATIONAL EQUIPMENT CO.
101 West Second South St.
Salt Lake City, Utah

LOS ANGELES, CALIF.
520 W. 74th St.

COLUMBUS, OHIO
750 N. High St.

INDUSTRIAL VIBRATOR EQUIP. CORP.
50 Church St.
New York, N. Y.

GELLATLY & COMPANY, INC.
Oliver Bldg., Pittsburgh, Penna.

FOR racking, twisting, straining wear and tear on shovels nothing beats quarry work. In every quarry where a Lorain machine has been installed no other machine of any type, size or make except Lorain has been purchased afterwards.

The extra strength and the extra power, plus the exclusive Center Drive on truck, superstructure and boom, makes the Lorain a better quarry machine. Another sales increase of over 60% for 1928 proves that the boys out on the job are making more money with Lorains.

THE THEW SHOVEL CO.
LORAIN, OHIO

*Shovels—Draglines*
*Cranes—Backdiggers*
*Gasoline, Steam or Electric Powered*

THEW

LORAIN 60 AND 75